RECORD OF DECISION
FOR THE
REALISTIC BOMBER TRAINING INITIATIVE

This document records the decision of the United States Air Force (Air Force) with regard to the Realistic Bomber Training Initiative (RBTI). In making this decision, the information, analysis, and public comments contained in both the Environmental Impact Statement (EIS) for Realistic Bomber Training Initiative (Federal Register Notice of Availability February 4, 2000) and the Supplemental EIS for Realistic Bomber Training Initiative (Federal Register Notice of Availability published August 11, 2006), were considered, among other relevant factors.

This Record of Decision (ROD) has been drafted in accordance with the regulations implementing the National Environmental Policy Act (NEPA); the President's Council on Environmental Quality (CEQ) NEPA regulations, Title 40 Code of Federal Regulations, Part 1505.2, Record of Decision in cases requiring environmental impact statements (40 CFR §1505.2); and the U.S. Air Force Environmental Impact Analysis Process, Title 32 Code of Federal Regulations, Part 989.21, Record of Decision (32 CFR 989.21).

After consideration of the issues addressed in the SEIS and the comments submitted, the Air Force decides not to change the decision described in the initial ROD (Air Force 2000b), and that record is hereby incorporated by reference (see attachment). The present ROD describes the purpose, background, alternatives analyzed, public involvement, supplemental pages, impacts, mitigation measures and management actions.

The purpose of RBTI is to:

1. Permit aircrews from Barksdale and Dyess Air Force Bases (AFBs) to train for their various missions while maximizing combat training time;
2. Provide the type and linked arrangement of airspace and other assets that support realistic training for bomber aircrews; and
3. Ensure that flexibility and variability in training support bomber combat missions.

RBTI fulfills this purpose by establishing a set of linked electronic scoring sites that provide realistic bomber training close enough to Barksdale and Dyess AFBs to effectively use limited flying hours.

BACKGROUND

On December 19, 1997, the NEPA process for RBTI began with publication of the Notice of Intent (NOI) in the *Federal Register*. The Draft EIS was published in March 1999 (Volume 64, Number 53). Fifteen public hearings were held in 11 communities. The Final EIS, published and made available to the public in January 2000, identified the preferred alternative as Alternative B.

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14. ABSTRACT

This Draft Supplemental EIS has been prepared in accordance with the National Environmental Policy Act and addresses the opinion filed October 12, 2004 by the Fifth Circuit Court of Appeals (Nos. 02-60288, 03-10506, and 03-10528) which directed the Air Force and FAA to prepare a supplemental EIS that adequately addresses both impacts of wake vortices on surface structures and FAA comments. Therefore, this Draft Supplemental EIS analyzes these two topics: wake vortex effects and response to FAA comments. Although the RBTI Final EIS is incorporated by reference, some portions of that Final EIS are reevaluated in this Supplemental EIS to ensure the analysis of environmental effects are considered in the proper context. In compliance with the order of the Fifth Circuit U.S. Court of Appeals, in this Supplemental EIS, the Air Force reevaluates and analyzes the potential impacts to structures, vehicles, persons, wildlife, and livestock from aircraft wake vortices. In this evaluation and analysis, the Air Force demonstrates that wake vortices, except under rare atmospheric and wind conditions from standard B-52 and B-1B low-altitude training flights fail to generate sufficient wind velocities to damage ground structures and vehicles, or pose a hazard to people or animals on the surface. During training operations associated with RBTI, the probability of a vortex reaching the ground and affecting a structure would be minimal. In addition, naturally-occurring wind gusts in the affected areas consistently exceed velocities potentially generated by vortices. While certain infrequent climbing maneuvers by B-1Bs could produce higher vortex velocities, the analysis indicates that the probability of such events occurring over ground structures such as windmills would be extremely low (e.g., 1 in 100 million or greater). Also, under rare atmospheric and wind conditions, vortex velocities could be higher than predicted. In the Final EIS (2000), the Air Force responded to an informal aeronautical study provided by the FAA by modifying text addressing the alternatives and analysis in the body of the EIS. However, the Court found the Air Force did not refer in the public comment appendix to where the FAA?s informal study was addressed or provide any written explanation with regard to that information. Thus, this Supplemental EIS presents the specific aeronautical information provided by the FAA, indicates how this information was addressed in the Final EIS, where FAA input resulted in changes in the proposed airspace configuration, and how the Air Force altered operations to address potential conflicts between military aircraft and civilian and commercial aircraft within these airspace units.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
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In March 2000, Air Force Deputy Chief of Staff for Air and Space Operations issued the initial ROD (Air Force 2000b), choosing Alternative B for implementation. The Air Force then submitted to the FAA its formal airspace proposal to establish the Lancer MOA in April 2000. After conducting its own independent evaluation, the FAA adopted the Final EIS and gave its final approval for the RBTI airspace on December 11, 2001, with an effective date of February 21, 2002.

After issuance of the Air Force ROD (Air Force 2000b), the Air Force and FAA were sued by parties alleging the Air Force and FAA failed to comply with NEPA, among other things. In March 2003, the U.S. District Court, Northern District of Texas, Lubbock Division, granted summary judgment in favor of the United States. The plaintiffs appealed to the U.S. Court of Appeals for the Fifth Circuit. One of the plaintiffs also filed a separate petition in the Fifth Circuit alleging that the FAA had failed to comply with NEPA in approving the RBTI airspace. In a single opinion covering both the Air Force and FAA cases, the Court of Appeals (October 2004) upheld the adequacy of the Final EIS in most respects, but remanded the action to the Air Force and FAA to prepare a Supplemental EIS analyzing the impact of wake vortices on ground structures and complying with the CEQ and Air Force requirements for addressing FAA comments. Consequently, the Air Force and FAA prepared a Supplemental EIS in compliance with the order of the Court of Appeals.

ALTERNATIVES ANALYZED

Four alternatives were analyzed in the Supplemental EIS: they included the no-action alternative (Alternative A), and three action alternatives, Alternatives B, C, and D. All three action alternatives fulfill the need defined under the proposed action. Alternative B: Instrument Route (IR)-178/Lancer MOA and Alternative C: IR-178/Texon MOA are almost entirely in western Texas. Only a small portion of airspace in these alternatives extends into New Mexico. Alternative D: IR-153/Mt. Dora MOA is located primarily in northeastern New Mexico with portions of the MTR extending into northwestern Texas. Because all three action alternatives predominantly coincide with existing MTR or MOA airspace, little area not currently exposed to overflights would be affected. Under Alternative A: No-Action, the Air Force would continue using existing assets and airspace would remain unchanged. All three action alternatives met operational goals defined for RBTI. Based on the original analysis presented in the EIS and the additional analysis presented in the Supplemental EIS, Alternative B continues to be the Air Force's operationally preferred alternative, as well as the environmentally preferred alternative.

PUBLIC INVOLVEMENT PERTAINING TO THE SEIS

In response to the Court of Appeals opinion, the Air Force, with the FAA as a cooperating agency, published a NOI in the *Federal Register* on January 12, 2005 to prepare a Supplemental EIS. Also in January 2005, the Air Force informed individuals, groups, and governmental entities that had been involved with or shown interest in the original RBTI process of its intent to prepare a Supplemental EIS. For this purpose, the Air Force sent out postcards to all individuals, groups, and governmental entities that had been on the mailing list for the original RBTI Final EIS.

The Air Force, in cooperation with the FAA, published a Notice of Availability for the Draft Supplemental EIS in the *Federal Register* on November 18, 2005 marking the beginning of the official comment period. Soon thereafter, the Air Force placed advertisements in six newspapers within the potentially affected areas to provide detailed information on the dates, times, locations, and format of the public hearings, local repositories within the potentially affected areas where the Air Force made copies of the Draft Supplemental EIS available to the public, duration of the comment period, and contact information for the Air Force.

Between November 10, 2005 and December 14, 2005, the Air Force distributed over 390 hard copies or compact disks (CDs) of the Draft Supplemental EIS to members of the public, organizations, libraries, and government agencies. An Air Force memorandum accompanied each document and listed the date, time, and location of the four public hearings, identified a website on which the Draft Supplemental EIS could be found, and provided a point of contact and address to submit written comments and request additional information.

Although originally slated to end after 45 days (January 3, 2006), the Air Force extended the public comment period for an additional 45 days. A notice was published in the *Federal Register* and press releases were sent to 50 newspapers in Texas and New Mexico announcing extension of the public comment period until February 17, 2006. Between December 5, 2005 and January 28, 2006, the Air Force and FAA conducted a total of five public hearings at locations in the proximity of the proposed action and alternatives. Lubbock, Texas was added as a fifth public hearing location based on requests from interested citizens.

SUPPLEMENTAL PAGES

The SEIS contains supplemental pages for 4-19 and 4-20 of Volume 1, Chapter 4 of the RBTI Final EIS, which examine wake vortex effects. These pages extensively supplement the analysis in the original Final EIS and also address issues raised during the public comment period. The SEIS also includes an introductory discussion and adds responses to comments addressing informal aeronautical information provided by the FAA. These pages attach to Volume II of the RBTI Final EIS, with comments on page 687 and responses on page 38.

IMPACTS

The analysis and data presented in the Final SEIS demonstrates that wake vortices, under normal flight operations, and in all but rare atmospheric conditions, from B-52 or B-1B low altitude flights fail to generate sufficient velocities to damage structures and vehicles, or pose a hazard to people or animals on the ground. The main conclusions derived from the analysis include:

a) The maximum wind speed caused by vortices does not occur at ground level, but rather at a minimum height related to wing span (on the order of 1/3 of a wing span);

b) Atmospheric conditions and winds, like those common to west Texas and northeastern New Mexico, may cause accelerated vortex decay and dissipation relative to that predicted by the model. Under rare conditions of calm winds and no atmospheric turbulence, vortices may persist longer and have greater velocities than predicted by the model;

c) Model results indicate that vortices resulting from standard B-52 training operations would produce minimal velocities of no more than 3 mph at the surface and 27 mph at 66 feet above ground level (AGL);

d) Vortices produced from standard B-1B flight generate vortex velocities of 10 mph at the surface and 27 mph at 22 feet AGL;

e) A pull-up maneuver by the B-1B, which may be executed once or twice per sortie-operation, can generate much higher vortex velocities Rare, rapid turns can also result in higher vortex velocities. These latter events, however are infrequent and the chance of these higher energy vortices impacting a windmill structure is extremely remote and improbable;

f) Commonly used wind scales demonstrate that the vortices would, except in the case of a combination of B-1B pull-ups or rapid turns and rare atmospheric conditions, produce velocities below those likely to affect structures and objects;

g) Structures, objects, persons, wildlife, and livestock in the area underlying proposed IR-178 and IR-153 are frequently subject to average winds and wind gusts that match potential B-52 and B-1B vortex wind speeds;

h) Factors limiting the potential effects of vortices include: only a portion of MTR segments would permit flight down to 300-500 feet AGL, many segments would be flown less than the maximum (i.e., 1560) number of annual sortie-operations incorporated by this ROD, and FAA rules require avoidance of structures; and

i) The probability of overflight of a windmill along the MTRs for Alternatives B, C, and D would be extremely low.

There would be no cumulative impacts within the scope of the Supplemental EIS from the interaction of RBTI Alternative B with other past, present, or reasonably foreseeable actions.

MITIGATION MEASURES AND MANAGEMENT ACTION

The Air Force will continue implementing mitigation measures and management actions identified in the initial ROD (Air Force 2000b). If anyone suffers harm as the result of damages to ground structures which they believe were caused by B-1 or B-52 wake vortices, that person may submit a claim or make a complaint to the Air Force. The circumstance of each individual claim or complaint will be reviewed to determine whether compensation or some other action is appropriate.

DECISION

After consideration of the potential environmental consequences of the three RBTI action alternatives and the No-Action Alternative analyzed in the original and Supplemental EIS documents, inputs from agencies and the public, and subject matters addressed in the initial ROD (Air Force 2000b) and this ROD, it is my decision to continue implementing Alternative B of the RBTI. This alternative includes the appropriate training assets under Instrument Route (IR) R-178/Lancer Military Operations Area (MOA).

As in the original analysis and decision, this supplemental analysis and decision-making employs all practicable means to avoid, minimize, or mitigate environmental impacts. This ROD serves as public notification of my decision. This decision has been made based on economic, technical, operational, and environmental considerations.

The Air Force will take appropriate action to request FAA implementation of the airspace modifications necessary to continue implementing Alternative B.

The Air Force will continue to work with the FAA and other federal agencies, state agencies, and local communities relative to the Realistic Bomber Training Initiative. This interaction will form the basis for long-term actions that will continuously address community concerns throughout the life of the proposal. These actions will help achieve the Air Force goal to continuously balance readiness training with environment and community concerns.

Carol H. Chandler

CARROL H. CHANDLER, Lt Gen, USAF
Deputy Chief of Staff
Operations, Plans and Requirements

24 Mar 07
Date

Attachment:

Initial ROD (March 2000)

RECORD OF DECISION
FOR THE
REALISTIC BOMBER TRAINING INITIATIVE

An Environmental Impact Statement (EIS) was prepared to aid in determining whether to establish the Realistic Bomber Training Initiative (RBTI). The purpose of RBTI is to:

(1) Permit aircrews from Barksdale and Dyess Air Force Bases to train for their various missions while maximizing combat training time;
(2) Provide the type and linked arrangement of airspace and other assets that support realistic training for bomber aircrews, and
(3) Ensure that flexibility and variability in training supports bomber combat missions.

RBTI will fulfill this purpose by establishing a set of linked training assets comprising an Electronic Scoring Site system that will provide realistic bomber training close enough to Barksdale and Dyess AFBs to effectively use limited flying hours. These assets would be located within approximately 600 nautical miles of Barksdale and Dyess AFBs and would involve:

(1) A Military Training Route (MTR) that offers variable terrain for use in terrain following and terrain avoidance, overlies lands capable of supporting electronic threat emitters and electronic scoring sites, permits flights down to 300 feet above ground level (AGL) in some segments, and links to a Military Operations Area (MOA).
(2) A MOA measuring at least 40 by 80 nautical miles with a floor of 3,000 feet AGL and extending to 18,000 feet above mean sea level (MSL) used for avoiding simulated threats and simulated attacks.
(3) An Air Traffic Control Assigned Area (ATCAA) above the MOA at 18,000 to 40,000 feet MSL to be used for high-altitude training.
(4) Establishing, through lease or purchase, a set of five locations (15 acres each) under or near the MTR corridor, and an additional five locations (15 acres each) under or near the MOA, for placing electronic threat emitters that would simulate the variety of realistic threats expected in combat.
(5) Constructing two Electronic Scoring Sites co-located with operations and maintenance centers, one under or near the MTR corridor and the other en route from the bases to the MTR and MOA on leased, purchased, or AF-owned property.
(6) Decommissioning two existing Electronic Scoring Sites in Harrison, Arkansas and La Junta, Colorado that do not fulfill the B-1 and B-52 training requirements. These sites do not provide the required training assets outlined above in items 1, 2 and 3.

ALTERNATIVES ANALYZED

Four alternatives were analyzed, a no-action alternative (Alternative A), and three action alternatives, Alternatives B, C and D. All three action alternatives fulfill the need defined

under the proposed action. Alternative B: IR-178/Lancer MOA and Alternative C: IR-178/Texon MOA are almost entirely in western Texas. Only a small portion of airspace in these alternatives extends into New Mexico. Alternative D: IR-153/Mt. Dora MOA is located primarily in northeastern New Mexico with portions of the MTR extending into northwestern Texas. All three action alternatives predominantly coincide with existing MTR or MOA airspace; little area not currently exposed to overflights would be affected. Under Alternative A: No-Action, the Air Force would continue using existing assets and airspace would remain unchanged. All three action alternatives meet operational goals defined for RBTI. Based on the analysis presented in the EIS, agency input, and public comments, the Air Force believes Alternative B is preferable to Alternatives A, C and D. Alternative B meets all operational requirements with less potential for adverse environmental impacts than Alternative C and significantly less than Alternative D. Therefore, Alternative B is the Air Force's environmentally and operationally preferred alternative.

PUBLIC INVOLVEMENT

The public involvement process followed by the Air Force for RBTI included:

(1) Community meetings prior to issuing a Notice of Intent (NOI) to prepare the RBTI Environmental Impact Statement (EIS);
(2) Scoping comment period and meetings;
(3) Intergovernmental /Interagency Coordination for Environmental Planning (IICEP) and Agency consultation; and
(4) Public comment period and hearings.

Efforts for early public involvement began in December 1997. These efforts consisted of six informal community meetings in Texas and New Mexico to gain input on the RBTI alternative identification process. Input from the community meetings helped shape the alternatives.

Official notification of the Air Force RBTI proposal began with publication of the NOI in the Federal Register on December 19, 1997. In late January and early February 1998, 11 scoping meetings were held in affected communities in Texas, New Mexico, Colorado and Arkansas. This started the scoping period during which the Air Force solicited comments from the public, interest groups and agencies to help define the scope of analysis for the EIS and to aid in identification of additional alternatives. All comments and letters were considered and used to help develop the scope for the analysis for the draft EIS. The scoping period lasted through April 3, 1998, including a 45 day extension. Public involvement continued in April 1998 (following the formal scoping period), when Air Force representatives were invited to participate in two community meetings held in Taos and Angel Fire, New Mexico.

As part of Government-to-Government consultation for RBTI, 32 tribes and/or tribal-affiliated organizations that historically resided in the affected area were notified. At their request, ongoing discussions and consultations have continued throughout the National Environmental Policy Act (NEPA) process with the Jicarilla Apache Tribe and the Taos Pueblo in New Mexico.

Through the IICEP process, appropriate federal, state and local agencies were notified of the proposed action. In total, over 100 IICEP letters were sent to agencies and officials. Comments from these agencies and officials were reviewed for incorporation into the environmental analysis. The IICEP process also provided the Air Force an opportunity to seek and obtain data on resources within the jurisdiction of each agency or organization, and to gather relevant information on issues affecting the RBTI proposal. Meetings with several agencies were conducted, including with the U.S. Fish and Wildlife Service (USF&WS) as part of consultation for Section 7 of the Endangered Species Act.

The Federal Aviation Administration (FAA) was a cooperating agency for this EIS.

A 45 day public comment period on the draft EIS began with publication of the Notice of Availability (NOA) on March 19, 1999. As with scoping, a 45-day extension was granted, allowing 90 days total for the public comment period. Fifteen meetings were held in 11 locations in Texas, New Mexico, Colorado and Arkansas. All comments were reviewed and considered in development of the final EIS, and this decision.

The Air Force goal is to continuously balance readiness training with the environment and community concerns. This includes actions during the proposal development process, management actions coincident with project start-up, and most importantly, those long-term actions that continuously address community concerns throughout the life of the project.

DECISION

After considering the operational utility and potential environmental consequences of the three RBTI action alternatives and the No-Action Alternative, the Air Force chooses to implement Alternative B, which involves locating the appropriate training assets under IR-178/Lancer MOA. The Air Force will take action required to request FAA implementation of the airspace modifications necessary to implement Alternative B.

IMPACTS

Historically, the affected airspace under RBTI accommodated aircraft overflights, including military flight training activities and civil aviation. Existing airspace will be used to the maximum extent possible for IR-178 and Lancer MOA. Some airspace will be eliminated and new airspace added. Under Alternative B, airspace management will remain similar to that found today. The potential for conflicts with civil aviation will not be significant, although coordinating with civilian aviators involving weather-modification, crop dusting, ranching and other similar management activities will require increased attention and resources from the Air Force. For Alternative B, average daily sortie operations will range from 1 to 10, depending upon the segment of the MTR. Sortie numbers will vary from an increase of 1 to 6 to a decrease of up to 5 per operational day as compared to historic airspace use on given segments.

Noise levels will range from 45 to 61 dB (Average Day-Night Sound Level [DNL]) for Alternative B. There will be an increase in noise of 2 to 13 dB depending on the route/MOA segment examined. Noise analysis indicated an increase in the percentage of people potentially

highly annoyed under RBTI. For Alternative B, the percentage of highly annoyed people could rise to a maximum of 8 percent for portions of IR-178. Under the Lancer MOA, the analysis showed approximately one percent of the people could be highly annoyed.

Effects of aircraft emissions on air quality and the potential for aircraft mishaps will be inconsequential for Alternative B.

Overall, there would be no likely effects to designated land use, recreation or visual resources. Increases in noise levels from aircraft could be perceived by some as affecting their quality of life. However, the analysis revealed no impacts on recreation, property values, or hunting leases. This is evidenced in other MOAs within the region where recreation, property values and hunting leases remain unaffected by aircraft overflights more numerous than those projected for RBTI. Six communities under Alternative B could experience increases in noise levels of 2 to 8 dB. Aircrews, however, will avoid overflights of communities by the standards set forth in FAA regulations.

Field surveys at the emitter and Electronic Scoring Sites for Alternative B did not identify any threatened, endangered or sensitive species. Under Alternative B, increased overflights would occur over estimated historic Aplomado Falcon habitat; however, only 11 sightings have occurred in the region since 1992. The Air Force has consulted with the USF&WS on the Endangered Species Act relative to RBTI. The USF&WS concurs with the Air Force determination that this action is not likely to adversely affect threatened and endangered species.

Construction of the Electronic Scoring Sites in Texas will result in a beneficial socioeconomic impact. Decommissioning of the Electronic Scoring Sites in Harrison, Arkansas and La Junta, Colorado will result in minimal negative socioeconomic impacts. The effects of flying activities are not expected to produce measurable impacts on the economic value of the land since this area has been generally overflown since the 1940's. Other factors, such as drought, market prices, community amenities, and proximity to urban areas are more likely to affect land values than military aircraft overflights. The environmental justice analysis established that implementation of Alternative B will have no adverse impact.

The Air Force surveyed the proposed emitter and Electronic Scoring Sites for cultural resources that could be affected by construction and ground operations. One archaeological site could be affected under Alternative B. However, impacts to this site could be avoided or mitigated to insignificance through completion of the Section 106 process of the National Historic Preservation Act and employment of a combination of avoidance, monitoring, testing, and data recovery (if needed), or selection of an alternative site. Existing research and consultation with appropriate Native American tribes indicated no identified traditional resources within the affected airspace of Alternative B. Although 15 National Register-listed properties could be overflown, overflights will occur in areas already subject to military aircraft overflights and aircraft would not create a new visual or audible feature in an otherwise historic or traditional landscape. Noise from aircraft overflights would not reach levels likely to damage structures. Therefore, the effects of visual or audible intrusions or damage from noise or vibrations would be negligible. No National Historic Landmarks are located under Alternative B.

Proper management will be followed to reduce effects of any potential short-term wind and water erosion of surface soils to insignificant levels. Landowners will retain control of any mineral or water rights. No long-term impacts to water resources will occur as a result of construction or use of the Electronic Scoring Sites or emitters.

There would be no cumulative impacts from the interaction of RBTI Alternative B with other past, present or reasonably foreseeable actions.

MITIGATION MEASURES

The mitigation measures presented below reflect specific actions the Air Force will take to reduce the potential for particular effects to resources, as identified in the EIS.

(1) The Air Force will reduce potential impact (as identified by USF&WS) to Aplomado Falcon habitat by:
  (a) Evaluating the areas under IR 178 that are not currently being surveyed.
  (b) Expanding the ongoing Aplomado Falcon survey into areas the evaluation determines may be Aplomado Falcon habitat.

(2) The Air Force will avoid or reduce potential impacts to biological and cultural resources from construction or modification of access roads, power lines, and telephone lines by:
  (a) Consulting with State Historic Preservation Office (SHPO).
  (b) Consulting with USF&WS.
  (c) Surveying rights-of-way for cultural and biological resources.
  (d) Realigning rights-of-way to avoid resources, where feasible.
  (e) Developing and implementing site-specific mitigation measures, if required.

(3) The Air Force will avoid or reduce potential impacts to cultural resources from the decommissioning of the La Junta Electronic Scoring Site, including disposition of lands out of federal ownership, by completion of the National Historic Preservation Act's Section 106 process.

MANAGEMENT ACTIONS

In addition to the mitigation measures described above, two types of management actions are designed to address concerns:

Management Actions incorporated into the proposal: These actions used project design, configuration, and/or component location to reduce or eliminate potential impacts to a resource or suite of resources. Such actions include the use of existing information or data collected as part of the public involvement process to avoid siting alternative components in areas or settings known to contain resources that could be significantly

affected. Such avoidance is not absolute; rather it is balanced with training and operational considerations needed to perform realistic bomber training.

(1) Citizens expressed concerns about creating new military airspace. The Air Force followed the FAA policy of using existing airspace to the maximum extent possible. This proposal used 85% existing airspace by:
  (a) Linking segments of existing MTRs to form a complete MTR, IR 178.
  (b) Linking portions of three existing MOAs to form a complete MOA, the Lancer MOA.

(2) Concerns were expressed about the structure of the proposed MTR, IR 178. The Air Force reduced noise related to individual overflights and associated effects by raising the floor of several segments of the proposed IR 178.

(3) Agencies expressed concerns that flexibility was needed in the number and siting of emitter sites and Electronic Scoring Sites to address potential environmental impacts. The Air Force provided flexibility and minimized impact by:
  (a) Considering more sites than would be required for the Electronic Scoring Sites and emitter sites.
  (b) Eliminating many candidate sites that contained known historical sites, or were located too close to homes, large structures, and obvious bodies of water.

(4) The public expressed concerns with potential environmental consequences due to site and infrastructure construction associated with emitter sites and Electronic Scoring Sites. The Air Force minimized impact by:
  (a) Selecting candidate sites as close as possible to existing roads, as well as power and telephone lines so that less area would be affected by construction.
  (b) Choosing previously disturbed areas, where feasible.
  (c) Conducting surveys to locate sensitive cultural or biological resources to avoid or minimize disturbance.

(5) Citizens expressed concerns about exposing the public to radio frequency energy from emitters. The Air Force minimized risk and ensured public safety by using sites that contain an 800 X 800 foot fenced area that provides 150 feet of extra safe-separation distance.

(6) Concerns were expressed that construction and maintenance of emitter sites and Electronic Scoring Sites could increase erosion and therefore affect soils and water resources. The Air Force will minimize impacts, preserve wetlands and drainages, and reduce erosion by specifying best management practices and selecting sites that avoid wetlands, drainages, and areas with sloped terrain.

(7) The public and agencies expressed concerns regarding the altitude of the MOA floor. The Air Force will provide additional separation between military operations and civil aviation by establishing the floor of the MOA above the Instrument Approach Procedures minimum altitudes for all airports under or adjacent to the Lancer MOA.

Management Actions to address community/agency concerns: These actions were developed to address concerns voiced by the public and agencies. These concerns were received through oral and written comments during the public comment period.

(1) Citizens expressed concerns about the increased number of flights proposed for IR 178. The Air Force will reduce the impact of individual low-altitude-flights, compared to projections in the EIS, by limiting the annual sortie-operations to 1,560 (about 6 per day), instead of the proposed 2,600 (about 10 per day).

(2) The public expressed concerns that the floor of some segments of the proposed IR 178 were proposed to be lower (200 feet AGL) than the minimum flight altitude of 300 feet AGL. The Air Force will institute IR 178 segment altitudes that correspond with minimum flight altitudes by raising the floor of all segments of IR 178 to a minimum of 300 feet AGL.

(3) Agencies and the public expressed concerns about the interaction between military use of the Lancer MOA and underlying airport traffic. They also indicated concern about the interaction between military use of IR 178 and the Lancer MOA with general aviation activities in the region. The Air Force will increase communication opportunities with civil aviators by establishing a 1-800 telephone number to Dyess AFB for airspace schedule information. Additionally, the Air Force will allow easier access to local airports, raise awareness and avoid potential conflicts between military and general aviation aircraft flying in local airspace by establishing a Military Radar Unit (MRU) and real-time communications. The MRU will be operational concurrently and co-located with the en route Electronic Scoring Site, and will become a critical part of the long-term actions that continuously address community concerns.

(4) The public expressed concerns about conflicts between military flights and local aviation in the vicinity of the proposed re-entry route on IR 178. The Air Force will reduce the potential for conflicts by raising the floor of the IR 178 re-entry route to 6,000 feet MSL.

(5) Concerns were expressed that there could be an increase in noise complaints and some citizens indicated that noise complaints are not handled effectively. The Air Force will provide improved communication opportunities between the public and the Dyess AFB Public Affairs Office by publicizing an existing 1-800 telephone number, and encouraging citizens to contact the base with concerns or complaints.

(6) The public and agencies expressed concern about the potential adverse effect on known cultural resources associated with locating the en route Electronic Scoring Site near Dyess AFB. The Air Force will continue to develop and examine ways to minimize these potential effects to include the possibility of locating the en route Electronic Scoring Site on an evaluated candidate site under the Lancer MOA, at a local municipal airport, or other suitable location. In the event this management action leads to a substantive change, the Air Force will undertake any additional environmental analysis required by this change. Additionally, aircraft overflights will be limited to 5,000 AGL or higher when within 3 nautical miles of the en route Electronic Scoring Site.

(7) Although not addressed in the EIS, the Air Force will also implement the following initiatives to further enhance public involvement:

(a) Designate Dyess AFB as the single point of contact for all noise complaints within the confines of the Lancer MOA.

(b) Create a web site to provide the public RBTI information.

(c) Establish a team to routinely gather public issues and information to address citizen concerns.

SUMMARY

The Air Force will continue to work with the FAA and other federal agencies, state agencies, and local communities during and after the establishment of the Realistic Bomber Training Initiative. This interaction will aid in the reduction of noise impacts on the affected area and form the basis for long-term actions that will continuously address community concerns throughout the life of the project. These actions will help achieve the Air Force goal to continuously balance readiness training with the environment and community concerns.

The EIS used public involvement to identify alternatives and impacts, and assess the environmental consequences associated with the Realistic Bomber Training Initiative. Where feasible, the Air Force developed mitigation measures and management actions to minimize the environmental impact and address the concerns and comments of agencies and the public.

MARVIN R. ESMOND, Lt Gen, USAF
Deputy Chief of Staff
Air & Space Operations

DEPARTMENT OF THE AIR FORCE

Realistic Bomber Training Initiative

Draft
Supplemental Environmental Impact Statement **November 2005**

In cooperation with the Federal Aviation Administration

ACRONYMS AND ABBREVIATIONS

Air Force	United States Air Force
AFB	Air Force Base
AGL	Above Ground Level
ATCAA	Air Traffic Control Assigned Airspace
ATD	Air Traffic Division
CD	Compact Disk
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
HQ ACC	Headquarters Air Combat Command
IR	Instrument Route
MOA	Military Operations Area
mph	Miles Per Hour
MSL	Mean Sea Level
MTR	Military Training Route
NAS	National Airspace System
NEPA	National Environmental Policy Act
nm	Nautical Miles
NOA	Notice of Availability
NOI	Notice of Intent
RBTI	Realistic Bomber Training Initiative
ROD	Record of Decision
USC	United States Code

PRIVACY ADVISORY

Public comments on this Draft Supplemental Environmental Impact Statement (EIS) are requested pursuant to the National Environmental Policy Act, 42 USC 4321, et seq. All written comments received during the comment period will be made available to the public and considered during Final Supplemental EIS preparation. The provision of private address information with your comment is voluntary. However, this information is used to compile the mailing list for Final Supplemental EIS distribution and failure to provide such information will result in your name not being included on the list. Private address information will not be released for any other purpose unless required by law.

COVER SHEET
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
FOR THE REALISTIC BOMBER TRAINING INITIATIVE

a. *Responsible Agency:* U.S. Air Force

b. *Cooperating Agency:* Federal Aviation Administration (FAA)

c. *Proposals and Actions*: The United States Air Force (Air Force) prepared this Supplemental Environmental Impact Statement (EIS) for the Realistic Bomber Training Initiative (RBTI) to further address wake vortex impacts and certain FAA comments as required by the October 12, 2004 order of the Fifth Circuit Court of Appeals in Davis Mountains Trans-Pecos Heritage Association, *et al.* v. U.S. Air Force, *et al.* and Davis Mountains Trans-Pecos Heritage Association v. FAA, *et al.* The Notice of Intent (NOI) to prepare this Supplemental EIS was published in the *Federal Register* on January 12, 2005. This supplement enhances and adds to the Final EIS which identified Alternative B, IR-178/Lancer MOA as the preferred alternative to provide bomber training for B-1Bs from Dyess AFB, Texas and B-52s from Barksdale AFB, Louisiana. The NOI to prepare the original RBTI EIS was published in the *Federal Register* on December 19, 1997; the Draft EIS was published in March 1999 with a Notice of Availability (NOA) published in the *Federal Register* on March 19, 1999; and the Final EIS was made available to the public in January 2000, with a NOA published in the *Federal Register* on February 4, 2000. A Record of Decision (ROD) was issued on March 24, 2000.

d. *For Additional Information:* Ms. Sheryl Parker, RBTI SEIS Project Manager, HQ ACC/A7ZP, 129 Andrews Street, Suite 102, Langley AFB VA 23665-2769. Telephone inquiries may be made to the Dyess AFB Public Affairs office at (325) 696-2863.

e. *Designation:* Draft Supplemental Environmental Impact Statement

f. *Abstract:* This Draft Supplemental EIS has been prepared in accordance with the National Environmental Policy Act and addresses the opinion filed October 12, 2004 by the Fifth Circuit Court of Appeals (Nos. 02-60288, 03-10506, and 03-10528) which directed the Air Force and FAA to prepare a supplemental EIS that adequately addresses both impacts of wake vortices on surface structures and FAA comments. Therefore, this Draft Supplemental EIS analyzes these two topics: wake vortex effects and response to FAA comments. Although the RBTI Final EIS is incorporated by reference, some portions of that Final EIS are reevaluated in this Supplemental EIS to ensure the analysis of environmental effects are considered in the proper context.

In compliance with the order of the Fifth Circuit U.S. Court of Appeals, in this Supplemental EIS, the Air Force reevaluates and analyzes the potential impacts to structures, vehicles, persons, wildlife, and livestock from aircraft wake vortices. In this evaluation and analysis, the Air Force demonstrates that wake vortices, except under rare atmospheric and wind conditions from standard B-52 and B-1B low-altitude training flights fail to generate sufficient wind velocities to damage ground structures and vehicles, or pose a hazard to people or animals on the surface. During training operations associated with RBTI, the probability of a vortex reaching the ground and affecting a structure would be minimal. In addition, naturally-occurring wind gusts in the affected areas consistently exceed velocities potentially generated by vortices. While certain infrequent climbing maneuvers by B-1Bs could produce higher vortex velocities, the analysis indicates that the probability of such events occurring over ground structures such as windmills would be extremely low (e.g., 1 in 100 million or greater). Also, under rare atmospheric and wind conditions, vortex velocities could be higher than predicted. In the Final EIS (2000), the Air Force responded to an informal aeronautical study provided by the FAA by modifying text addressing the alternatives and analysis in the body of the EIS. However, the Court found the Air Force did not refer in the public comment appendix to where the FAA's informal study was addressed or provide any written explanation with regard to that information. Thus, this Supplemental EIS presents the specific aeronautical information provided by the FAA, indicates how this information was addressed in the Final EIS, where FAA input resulted in changes in the proposed airspace configuration, and how the Air Force altered operations to address potential conflicts between military aircraft and civilian and commercial aircraft within these airspace units.

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

SUMMARY

S1.0 SUMMARY

The United States Air Force (Air Force), in cooperation with the Federal Aviation Administration (FAA), prepared this Draft Supplemental Environmental Impact Statement (EIS) for the Realistic Bomber Training Initiative (RBTI) to fulfill the requirements set down in an opinion of the United States Court of Appeals for the Fifth Circuit (Nos. 02-60288, 03-10506, and 03-10528). The Court directed the Air Force and FAA to prepare a Supplemental EIS that adequately addresses impacts of wake vortices on surface structures and provides responses to FAA comments (Appendix A). This supplement clarifies and adds to the RBTI Final EIS only with regard to the two topics (i.e., wake vortices and FAA comments) identified by the Court. The Court ruled that the RBTI Final EIS adequately addressed other topics (e.g., effects on livestock and economics; mitigation measures) examined in the lawsuit in conformance with National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321-4307f) and the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500.1-1508.28).

The RBTI Final EIS (Air Force 2000a) analyzed three action alternatives designed to provide realistic, integrated training for B-1B aircraft from Dyess Air Force Base (AFB), Texas, and B-52 aircraft from Barksdale AFB, Louisiana. Each action alternative included a proposed Instrument Route (IR) used for low-altitude training and a Military Operations Area (MOA) for other training. The three action alternatives consisted of:

- Alternative B – IR-178/Lancer MOA
- Alternative C – IR-178/Texon MOA
- Alternative D – IR-153/Mt. Dora MOA

In accordance with NEPA and CEQ regulations, the RBTI Final EIS also evaluated the no-action alternative (Alternative A). In the Final EIS, the Air Force identified Alternative B as the preferred alternative to provide the needed realistic bomber training. Alternative B involved modifications to an existing IR military training route (MTR) and establishment of a MOA, as well as development of ground-based electronic scoring and emitter sites. Alternative B lies mostly in west Texas with a small portion of MTR airspace overlying southeastern New Mexico (Figure S1-1). Alternative C, IR-178/Texon MOA, shares many characteristics with Alternative B, including its location in west Texas and southeastern New Mexico (Figure S1-2). Alternative D, IR-153/Mt. Dora MOA, lies in northeastern New Mexico (Figure S1-3). To ensure compliance with the Court's requirements, this Supplemental EIS examined the potential effects of wake vortices for each alternative. Similarly, FAA comments on all three action alternatives received detailed attention.

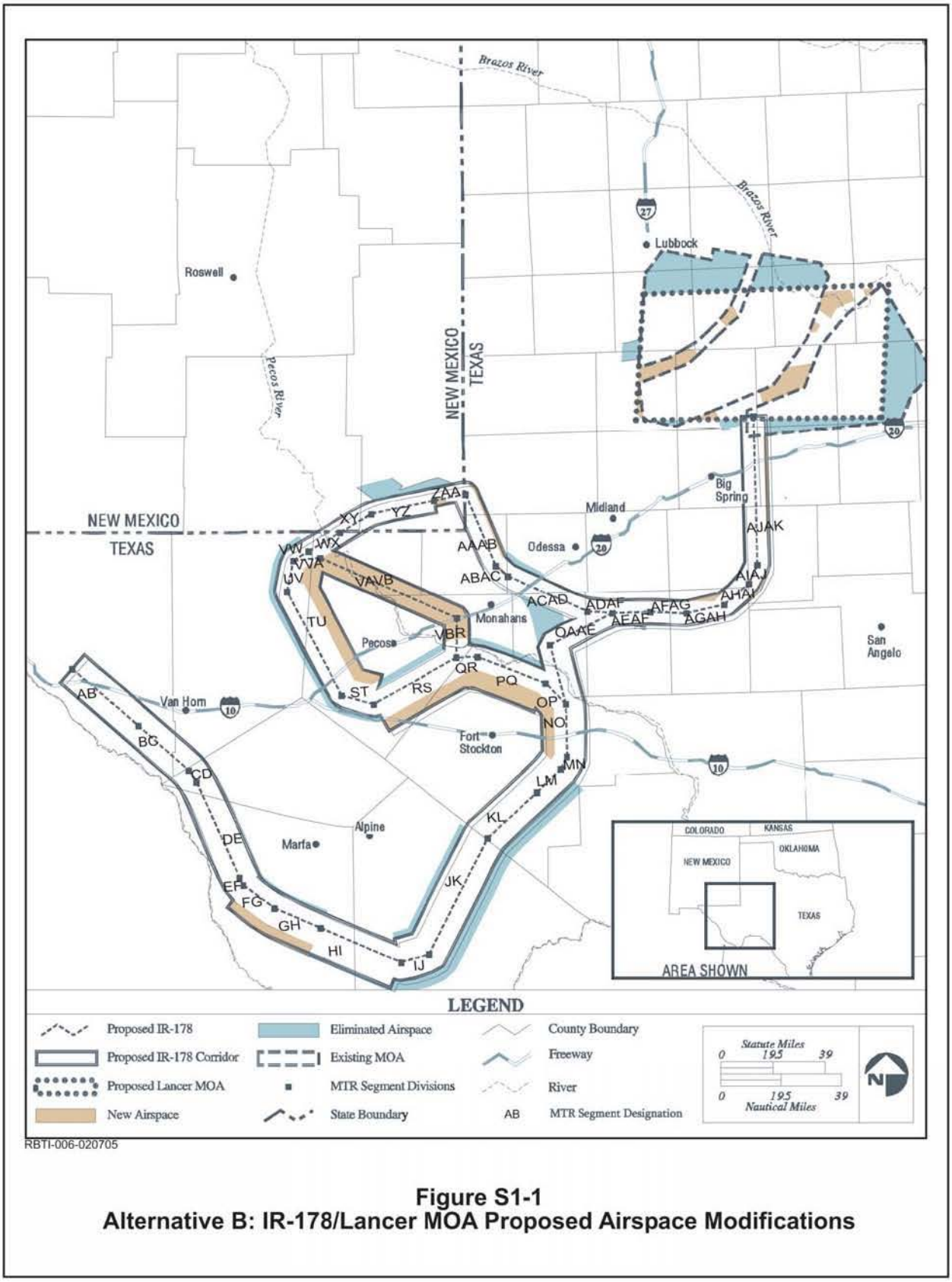


Figure S1-1
Alternative B: IR-178/Lancer MOA Proposed Airspace Modifications

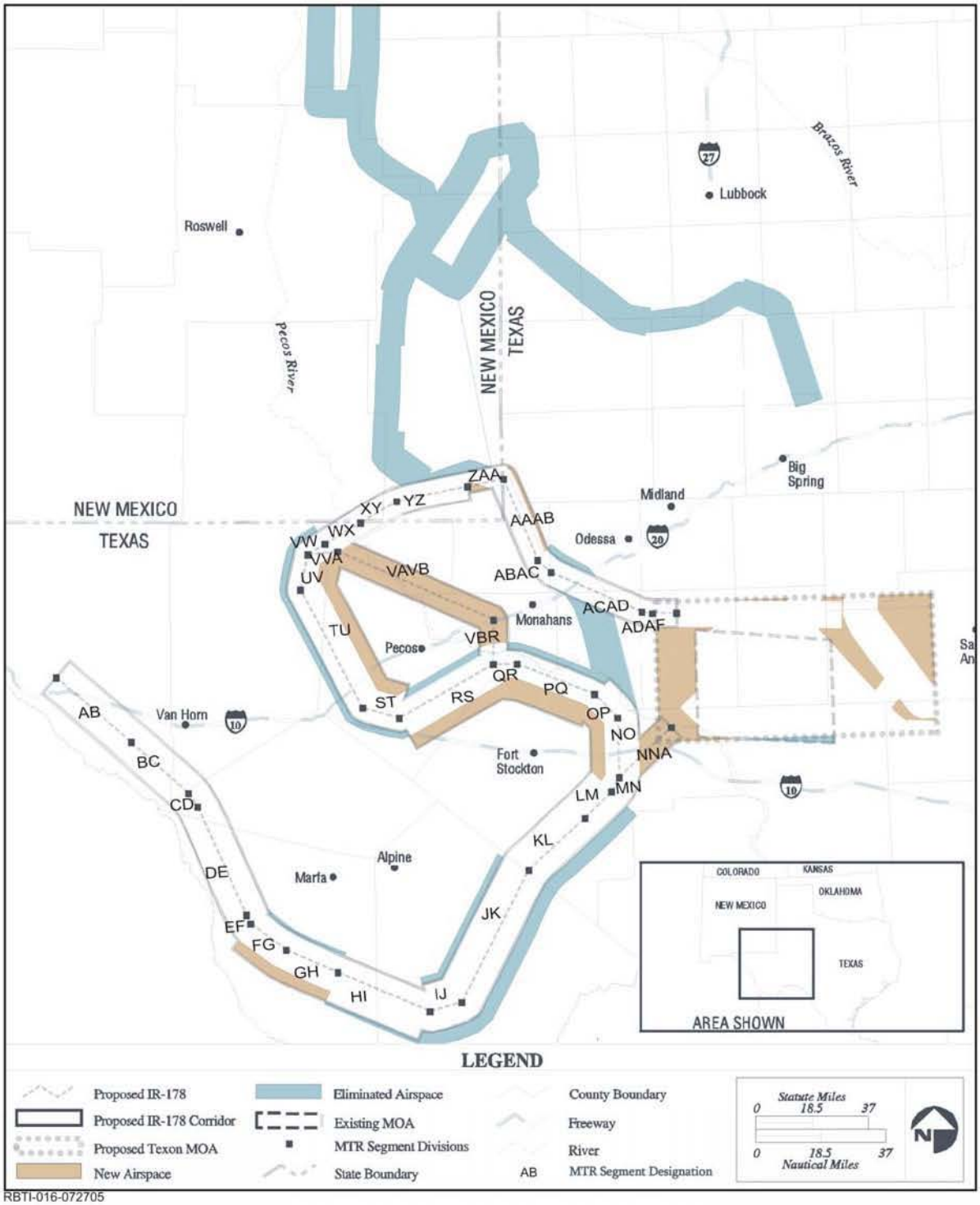


Figure S1-2
Alternative C: IR-178/Texon MOA Proposed Airspace Modifications

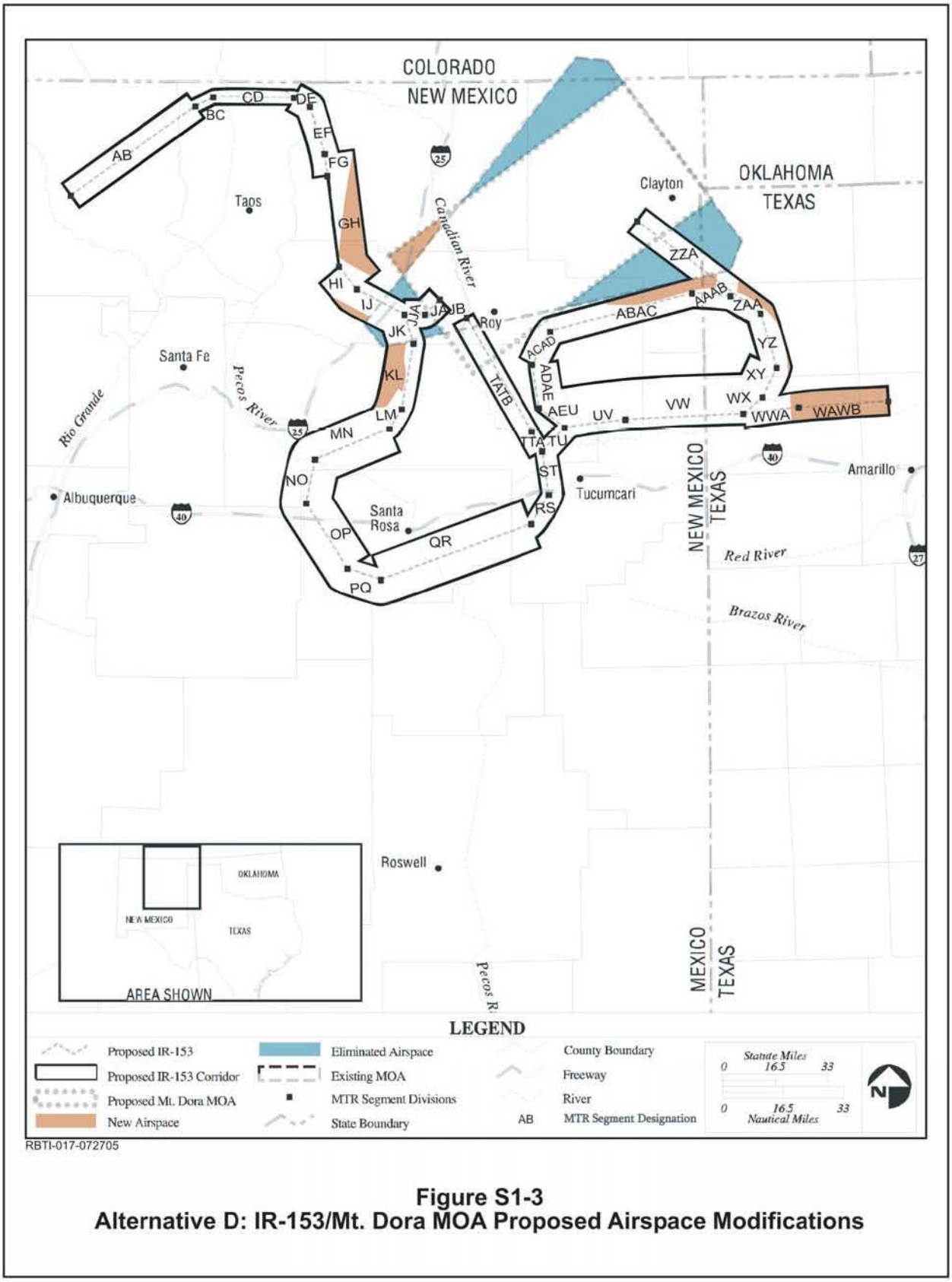


Figure S1-3
Alternative D: IR-153/Mt. Dora MOA Proposed Airspace Modifications

The Notice of Intent (NOI) to prepare an EIS for RBTI was published in the *Federal Register* on December 19, 1997; the Draft EIS (Air Force 1999) was published in March 1999 with a Notice of Availability (NOA) published in the *Federal Register* on March 19, 1999; and the RBTI Final EIS was made available to the public on January 23, 2000, with a NOA published in the *Federal Register* on February 4, 2000. The Air Force issued a Record of Decision (ROD) on March 24, 2000 (Air Force 2000b), selecting IR-178/Lancer MOA (Alternative B) as the action to be implemented. The FAA's approvals of the airspace for RBTI were finalized on December 11, 2001 (FAA 2001), with an effective date of February 21, 2002 (Appendix B).

S1.1 Background

RBTI Proposed Action

Under the RBTI Final EIS (Air Force 2000a), the Air Force proposed to establish a set of linked training assets comprising an Electronic Scoring Site System to provide realistic bomber training close enough to Barksdale and Dyess AFBs to efficiently use flying hours. This Electronic Scoring Site System would contain the following components:

- An MTR that offers variable terrain for terrain following and avoidance, overlies lands capable of supporting electronic emitters and electronic scoring sites, permits flight down to 300 feet above ground level (AGL) in some segments and links to a MOA;
- A MOA measuring at least 40 by 80 nautical miles (nm) with a floor altitude of 3,000 feet AGL and extending to 18,000 feet above mean sea level (MSL)[1];
- An Air Traffic Control Assigned Airspace (ATCAA) above the MOA at 18,000 to 40,000 feet MSL[1];
- A set of five locations (15 acres each) for placing electronic threat emitters under or near the MTR corridor and five locations (15 acres each) for placing electronic threat emitters under or near the MOA;
- Two Electronic Scoring Sites co-located with operations and maintenance centers, one under or near the MTR corridor and the other en route from the bases to the MTR and MOA; and
- Decommissioning of two existing Electronic Scoring Sites in Harrison, Arkansas, and La Junta, Colorado.

As noted previously, the RBTI Final EIS evaluated the environmental effects resulting from four alternatives. These consisted of Alternative A: No-Action; Alternative B: IR-178/Lancer MOA; Alternative C: IR-178/Texon MOA; and Alternative D: IR-153/Mt. Dora MOA. Under the no-action alternative, the bombers would continue to use existing airspace and electronic scoring sites at current levels. Action Alternatives B, C, and D would each involve the components detailed above.

[1] In FAA terms, this altitude is more accurately described as up to but not including flight level 180 (instead of 18,000 feet MSL) or flight level 400 (instead of 40,000 feet MSL).

Whereas the RBTI Draft EIS (Air Force 1999) proposed 2,660 annual sortie-operations on IR-178, the Air Force, in the Final EIS (Air Force 2000a) and ROD (Air Force 2000b), reduced that amount back to baseline levels of 1,560 annual sortie-operations. Also, the Air Force chose to raise the floor of some segments of IR-178 from an existing altitude of 200 feet AGL to 300 feet AGL. Proposed annual sortie-operations for the Lancer MOA totaled 2,350, but the Air Force identified management actions to reduce potential conflicts with other aviation, including several identified by the FAA.

In summary, when the RBTI Final EIS was published, the primary components of the proposed action, as described in the Draft EIS, remained intact. The Air Force made some changes to elements of the proposal from the Draft EIS to the Final EIS. These changes represented mitigation measures and management actions[2] designed to eliminate or reduce potential impacts from RBTI.

Previous RBTI NEPA Process

On December 19, 1997, the NEPA process for RBTI began with publication of the NOI in the *Federal Register*. This notice initiated scoping, which concluded on April 3, 1998, with the end of the public scoping period. The Air Force and FAA provided for extensive public scoping, with meetings held at nine locations throughout western Texas and northeastern New Mexico, as well as in Harrison, Arkansas, and La Junta, Colorado, from January 24, 1998 to February 6, 1998. In addition to public input, the Air Force sought the concerns of federal, state, and local agencies; technical specialists; and American Indian tribes. The scoping process, as required under CEQ regulations (40 CFR 1501.7), helped identify the issues requiring in-depth analysis in the Draft EIS, while indicating the resources not likely to be affected by the proposed action. Scoping revealed public concerns that included the effects of vortices from aircraft overflights and potential conflicts between military aircraft and civil and commercial activities.

The Air Force used this input to prepare the Draft EIS that was published in March 1999. More than 900 copies of the Draft EIS were distributed to agencies, the public, and repositories. Fifteen public hearings were held in 11 communities from April 7, 1999 through April 22, 1999. The Draft EIS identified the affected environment for each alternative, considered the current conditions of that affected environment, and compared those to conditions that could result from implementation of an alternative. Analysis evaluated direct, indirect, and cumulative effects. Six major resource categories were assessed: airspace and aircraft operations, land management and use, biological resources, socioeconomics and environmental justice, cultural resources, and soils and water resources. By the end of the 90-day public comment period on the Draft EIS (June 16, 1999), the Air Force had received a combined total of over 1,500 oral and written comments. The Air Force reviewed each comment and prepared responses that appeared in the Final EIS published in January 2000. Substantive comments resulted in changes or clarifications in the body of the EIS. All oral and written comments received during the official comment

[2] Management actions consist of actions incorporated into the proposal to reduce impacts and actions designed to address community/agency concerns.

period were also included in the Final EIS. The Final EIS identified the preferred alternative (Alternative B), presented mitigation measures to address potential environmental effects of the proposed action, included management actions to address public and agency concerns, and provided correction of minor typographical and spelling mistakes. While this Supplemental EIS provides additional analysis required by the Court, the preferred alternative remains Alternative B.

As a cooperating agency for the RBTI EIS, the FAA provided input to the Air Force as the lead agency in preparing the EIS. This input resulted in both modification to the alternatives and clarification of the analysis from the Draft EIS to the Final EIS. The Air Force asked the FAA's regional air traffic division (ATD) to conduct an informal study of the aeronautical impacts of the RBTI alternatives being considered by the Air Force. The regional ATD, in turn, requested information and review of the alternatives from relevant FAA field facilities and provided those results to the Air Force on August 6, 1999 after the close of the official comment period on the Draft EIS (Appendix B). Because it was offered as part of the informal give and take between the FAA as cooperating agency and the Air Force as lead agency on the RBTI EIS, neither agency regarded this study as representing formal "public" comment on the Draft EIS. To address these FAA issues, the Air Force modified some aspects of the alternatives and presented enhanced analysis of impacts to civil and commercial aviation in the Final EIS.

The Air Force made the Final EIS available to the public in January 2000. In March 2000, Air Force Deputy Chief of Staff for Air and Space Operations issued the ROD, identifying Alternative B for implementation (Air Force 2000b).

The Air Force submitted to the FAA its formal proposal to establish the Lancer MOA in April 2000 (Appendix C). Pursuant to FAA Order 7400.2D (now 7400.2E), the FAA conducted a formal aeronautical study of the proposed Lancer MOA (Appendix B). In coordination with the Air Force, the FAA's air traffic control facilities and regional ATD also reviewed and provided aeronautical concurrence on the Air Force's proposed modification to IR-178. After conducting its own independent evaluation, the FAA adopted the Final EIS and gave its final approval for the RBTI airspace. The FAA's approval of the RBTI airspace was finalized on December 11, 2001, with an effective date of February 21, 2002.

Court Opinions and Requirements

After issuance of the ROD, the Davis Mountains Trans-Pecos Heritage Association (Civil Action No. 5:00-CV-392-C) and Buster Welch *et al.* (Civil Action No. 5:01-CV-289-C), sued the Air Force and FAA, alleging the Air Force and FAA failed to comply with NEPA, among other things. In March 2003, the U.S. District Court, Northern District of Texas, Lubbock Division, dismissed both suits. The plaintiffs appealed to the U.S. Court of Appeals for the Fifth Circuit in 2004. One of the plaintiffs also filed a separate petition in the Fifth Circuit alleging that the FAA had failed to comply with NEPA in

approving the RBTI airspace. In a single opinion covering both the Air Force and FAA cases, the Court (October 2004) upheld the adequacy of the Final EIS in most respects, but "remanded to the Air Force and FAA to prepare a Supplemental EIS which adequately addresses wake vortex impacts and FAA comments as required by CEQ and Air Force regulations." This Supplemental EIS has been prepared to comply with the Court's order.

S1.2 Supplemental Pages

This Draft Supplemental EIS for RBTI contains supplemental pages for pages 4-19 and 4-20 of Chapter 4, Volume I in the Final EIS (Air Force 2000a) examining wake vortex effects. These pages extensively supplement the analysis in the Final EIS. The Draft Supplemental EIS also contains an introductory discussion and added responses to comments addressing informal aeronautical information provided by the FAA. These pages attach to Volume II, with comments on page 687, and responses on page 38 of the Final EIS. Volume II of the Final EIS contains agency and public comments on the Draft EIS, as well as Air Force responses to those comments. Page 38 comprises the final page of the section addressing comments about airspace operations. By adding the FAA input and Air Force responses, the Supplemental EIS is complying with the Court's order. Combination of this document with the Final EIS, which is incorporated by reference, constitutes the Supplemental EIS.

S1.3 Public Comment Process

The Air Force, in cooperation with the FAA, has prepared this Draft Supplemental EIS for RBTI. The U.S. Environmental Protection Agency will publish a NOA for the Draft Supplemental EIS in the *Federal Register*, which will mark the beginning of the official comment period. The comment period provides an opportunity for early and meaningful public participation on the Draft Supplemental EIS prior to a decision being made by the responsible official.

Public hearings will be held in west Texas at Pecos, Snyder, and Alpine, and in New Mexico at Taos, approximately two to three weeks following NOA publication of the Draft Supplemental EIS. Written and hand-delivered comments will be accepted for 45 days following the date of NOA publication. Written comments must be submitted to: RBTI Draft Supplemental EIS, Attn: Ms. Sheryl Parker, P.O. Box 65399, Langley AFB, Virginia, 23665-5399. Oral comments will be recorded verbatim at the public hearings.

The publication date of the NOA in the *Federal Register* is the exclusive means for calculating the comment period for the Draft Supplemental EIS. Those wishing to comment should not rely upon dates or timeframe information provided by any other source.

Comments received in response to this Draft Supplemental EIS, including names and addresses of those who comment, will be considered part of the public record and will be available for public inspection. Comments submitted anonymously will also be accepted and considered, but the Air Force will not be able to include the commentors in further notifications.

The Air Force has made reasonable accommodation for public review of the Draft Supplemental EIS and original Final EIS. This Draft Supplement EIS and the original RBTI Final EIS in CD format are available for review at Headquarters Air Combat Command (HQ ACC), Integrated Planning Branch (A7ZP), Langley AFB, Virginia; Dyess AFB, Public Affairs Office, Texas; and Barksdale AFB, Public Affairs Office, Louisiana. This Draft Supplemental EIS and the Final EIS CD are also available at the libraries listed in Table S1-1 and electronically at www.cevp.com. To obtain additional information or to request copies of the Draft Supplemental EIS, contact: HQ ACC/A7ZP, RBTI Draft Supplemental EIS, 129 Andrews Street, Suite 102, Langley AFB, Virginia, 23665-2769.

Table S1-1 Supplemental EIS Repositories

Abilene—Abilene Public Library	*Marfa*—Marfa City Municipal Library
Alpine—Alpine Public Library	*Merzton*—Irion County Library
Amarillo—Amarillo Public Library	*Monahans*—Ward County Library
Aspermont—Stonewall County Library	*Odessa*—Ector County Library
Barksdale AFB—Public Affairs Office	*Pecos*—Reeves County Library
Big Lake—Reagan County Library	*Post*—Post Public Library
Big Spring—Howard County Library	*Presidio*—City of Presidio Library
Crane—Crane County Library	*Rankin*—Rankin Public Library
Dalhart—Dallam County Library	*Rotan*—Rotan Public Library
Dyess AFB—Public Affairs Office	*San Angelo*—Tom Green County System Library
Ft. Davis—Jeff Davis County Library	*Sierra Blanca*—Sierra Blanca Public Library
Ft. Stockton—Ft. Stockton Public Library	*Snyder*—Scurry County Public Library
Jayton—Kent County Library	*Sterling City*—Sterling County Public Library
Kermit—Winkler County Library	*Taos*—Taos Public Library
Lamesa—Dawson County Public Library	*Tahoka*—City-County Library
Lubbock—Lubbock Library	*Van Horn*—Van Horn Library

CHAPTER 2

SUPPLEMENTAL ANALYSIS OF EFFECTS OF VORTICES

S2.0 SUPPLEMENTAL ANALYSIS OF EFFECTS OF VORTICES

The Air Force reevaluated and analyzed the potential impacts from wing-tip wake vortices on all action alternatives as required by the decision of the Fifth Circuit Court of Appeals. In its decision, the Fifth Circuit Court of Appeals remanded "to the Air Force and FAA to prepare a Supplemental EIS which adequately addresses wake vortex impacts."

S2.1 Background

In preparing this Supplemental EIS to reevaluate and analyze those impacts, the Air Force adopted and relied upon the analysis in the RBTI Final EIS (Air Force 2000a) in addition to the declaration of Ojars Skujins, Ph.D. and his branch's assessment of the potential for wing-tip wake vortices to affect ground structures (Appendix D). Dr. Skujins serves as the Chief of the Flight Mechanics Branch, Engineering Directorate, Aeronautical Systems Center at Wright-Patterson AFB. With 32 years experience in aerospace engineering analysis, Dr. Skujins offers vast experience on the subject of vortices. In addition, expertise from the FAA (George Greene) also contributed to enhancing the analysis.

Through this assessment, the Air Force recognized that wing-tip vortices represent complex phenomena. As discussed in detail later, numerous factors influence variability in the behavior of the vortices including air speed, wing span, aircraft weight, size, altitude, wind, weather, atmospheric turbulence, and G-forces. Due to these factors, the assessment in this Supplemental EIS considered many sources on wake vortex strength and behavior calculations, especially Kurylowich (1979), but also Blackmore (2002), Caiger and Gould (1970), Condit and Tracy (1970), FAA (1991), Garodz (1970), Holzäpfel *et al.* (2000), Nielsen and Schwind (1971), and Greene (personal communication 2005). Evaluation of this range of sources, which look at vortices from different perspectives, revealed that the approach employed by Kurylowich (1979) and adopted by the Air Force remains an effective methodology for estimating wing-tip vortex characteristics. This method characterizes vortex strength, duration, and decay well, but cannot account for all circumstances. Under rare climatic and wind conditions, vortex strength can be greater than predicted by the "Kurylowich" method (Greene, personal communication 2005).

S2.2 Definition of Vortices and Wake Turbulence

As aircraft move through the air, they create vortices from their wing tips. These vortices, collectively called wake turbulence (Figure S2-1), form as the air passes both over and under the wing tips. The pressure differential caused by the passing of air over and under the wings generates lift with the lowest pressure above the wing and the highest pressure under it. Due to this differential, a "rollup" of the airflow occurs behind the wing causing swirling air to trail from the wing tips. The rollup process produces a wake consisting of a counter-rotating vortex extending from each wing tip (FAA 1991).

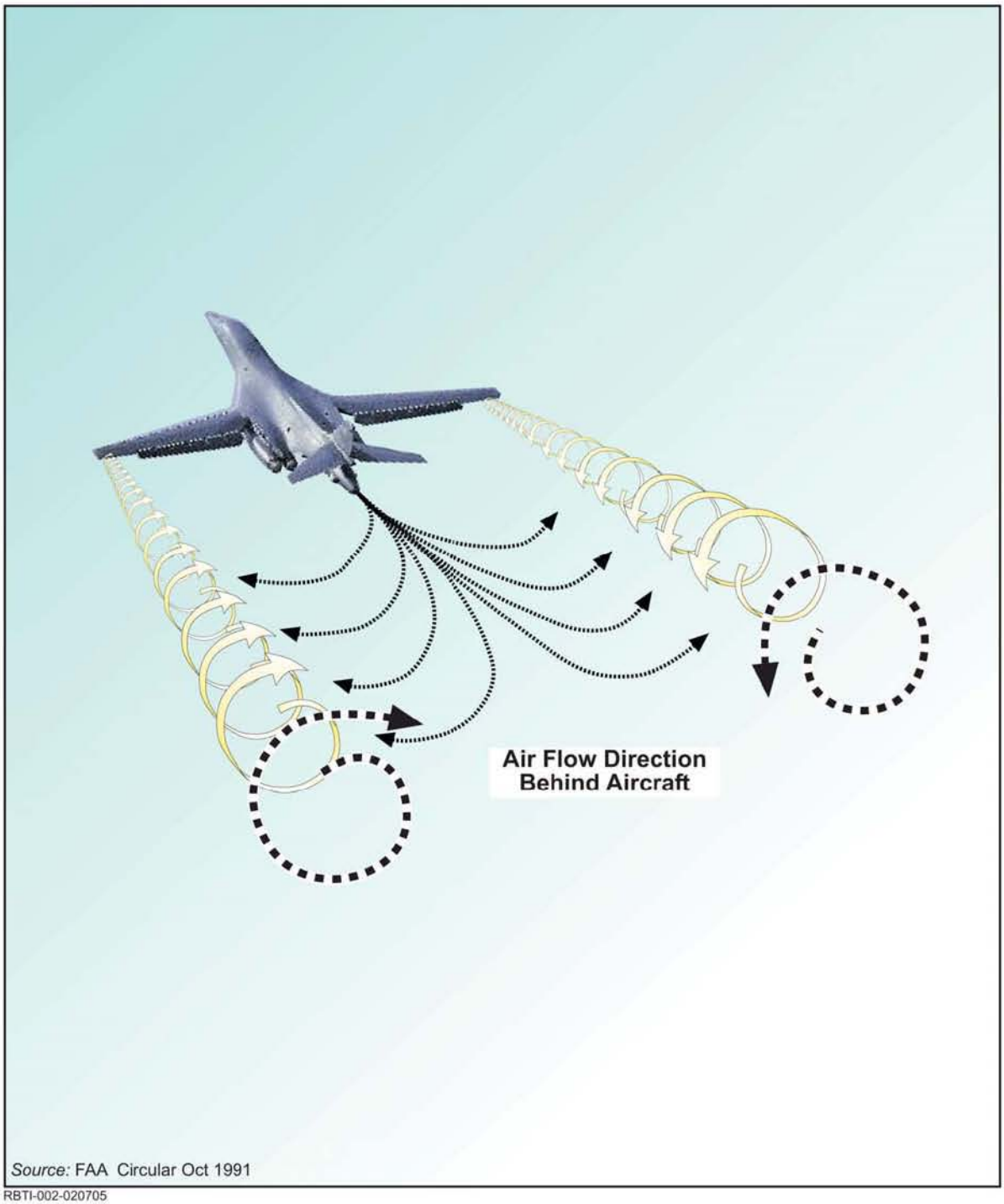


Figure S2-1
Anatomy of a Vortex Immediately Behind Aircraft

Aircraft begin to generate vortices as soon as the nose wheel lifts off the surface of the runway; vortex generation ends as soon as the nose wheel touches down during landing. Because wake turbulence from these vortices also occurs continuously during flight, it can represent a potential hazard to trailing aircraft, especially when a small aircraft follows a much larger aircraft. In such instances, the wake turbulence could cause the smaller aircraft to roll, pitch, and encounter temporary control problems. For these reasons, both the FAA and the Air Force have studied wake turbulence in detail (Caiger and Gould 1970; Garodz 1970; Johannes 1970; Landahl and Widnall 1970; Nielsen and Schwind 1971; Olsen *et al.* 1971), focusing on the topic of major concern—its effects on trailing aircraft during landing, takeoff, and flight. As a result of these efforts, the FAA and Air Force have characterized the strength, nature, and size of wake turbulence, as well as its probability of occurring. Still, both the Air Force and FAA recognize the need for continued refinement of the understanding of vortices. In addition, FAA procedures (FAA 1991) dictate safe following distances and procedures to avoid wake turbulence at all flight altitudes and during landing or takeoff.

S2.3 Vortex Behavior

A complex set of variables and conditions influence the behavior and persistence of vortices. These variables include aircraft weight and size, wing span, wind and weather conditions, atmospheric turbulence, flight mode, altitude, G-forces, and airspeed. The vortex characteristics of any given aircraft can also be changed by extension of flaps or other wing-configuring devices. For example, a B-1B aircraft can sweep its wings back or forward to achieve different flight characteristics. A wings-forward configuration generally applies to slower flight for landings and takeoffs not used on MTRs. A wings-back, or aft sweep, configuration applies to higher speed flight such as that occurring on proposed IR-178 or IR-153. For the B-1B, the wing span is 78 feet in aft sweep configuration. A B-52, with static wings, has a wing span of 185 feet.

B-1B with Wings in Aft Sweep

B-1B with Wings Forward

However, aircraft weight and airspeed tend to form the most influential factors, with slow and heavy aircraft generating stronger vortices. Both the B-52 and B-1B represent large, heavy aircraft. Under typical operating conditions, a B-52 weighs 450,000 pounds and a B-1B weighs 300,000 pounds. At those weights, they tend to generate greater vortices

than smaller aircraft. The heavier the aircraft, and the slower the speed, the greater intensity of wake turbulence (FAA 1991). Normal cruise flight speeds for the B-52 and B-1B are 0.6 Mach[1] and 0.85 Mach, respectively.

Other factors also influence vortex behavior, including lateral movement, descent, and decay. Decay results in break up of a vortex. Atmospheric conditions, particularly wind and atmospheric turbulence, cause vortices to break up faster and move laterally. In addition, temperature differentials and convection can form layers that cause vortices to rebound upwards, away from ground level (Holzäpfel *et al.* 2000). If vortices do descend to near-ground level, terrain variations also accelerate decay.

Nielsen and Schwind (1971) established a complex, three-stage development structure for vortices (Figure S2-2):

- Stage I is a rolling-up of the vortex directly behind the aircraft. At this stage, the counter-rotating vortices extend only a short distance behind the aircraft and consist of a relatively tight, organized airflow;
- Stage II occurs when the vortices reach equilibrium, become less organized, and diminish in strength while beginning to descend; and
- Stage III starts at the point where the vortices physically interact, lose organization, spread out, descend, and decay substantially in strength.

As an aircraft moves forward, the vortices trail behind with maximum velocities within a few feet of the center of the vortex and ever-decreasing velocities away from the center. Vortices also sink at a rate of up to several hundred feet per minute, slowing and losing strength as they descend further. Under normal training flight conditions, and under rare calm atmospheric conditions (i.e., almost no wind and no convection to cause turbulence), the vortex from a B-1B flying at 500 feet AGL would descend to below 100 feet AGL within 1 minute, then move laterally (i.e., perpendicular to aircraft) above the ground until it dissipates, typically within another minute (Figure S2-3). For a B-52 flying an MTR, under similar atmospheric conditions, the vortex descent to below 100 feet AGL could require more than 3 minutes before moving laterally above the ground. This vortex, however, would commonly dissipate before even reaching this minimum height (Figure S2-4). In time, the vortex velocities decrease and the vortices decay and break up. Usually, they dissipate in 1 to 2 minutes, although on rare occasions they can last much longer, depending on aircraft type and weather conditions (Skujins, personal communication 2005). Such occurrences are difficult to predict because modeling does not account for such rare circumstances.

Visible Vortices at High Altitude

[1]Mach is the measure of an aircraft's speed relative to the speed of sound at a given altitude (Mach 1). At sea level, Mach 1 equals 761 mph. In the area affected by RBTI, Mach 1 is roughly 750 to 755 mph at the surface.

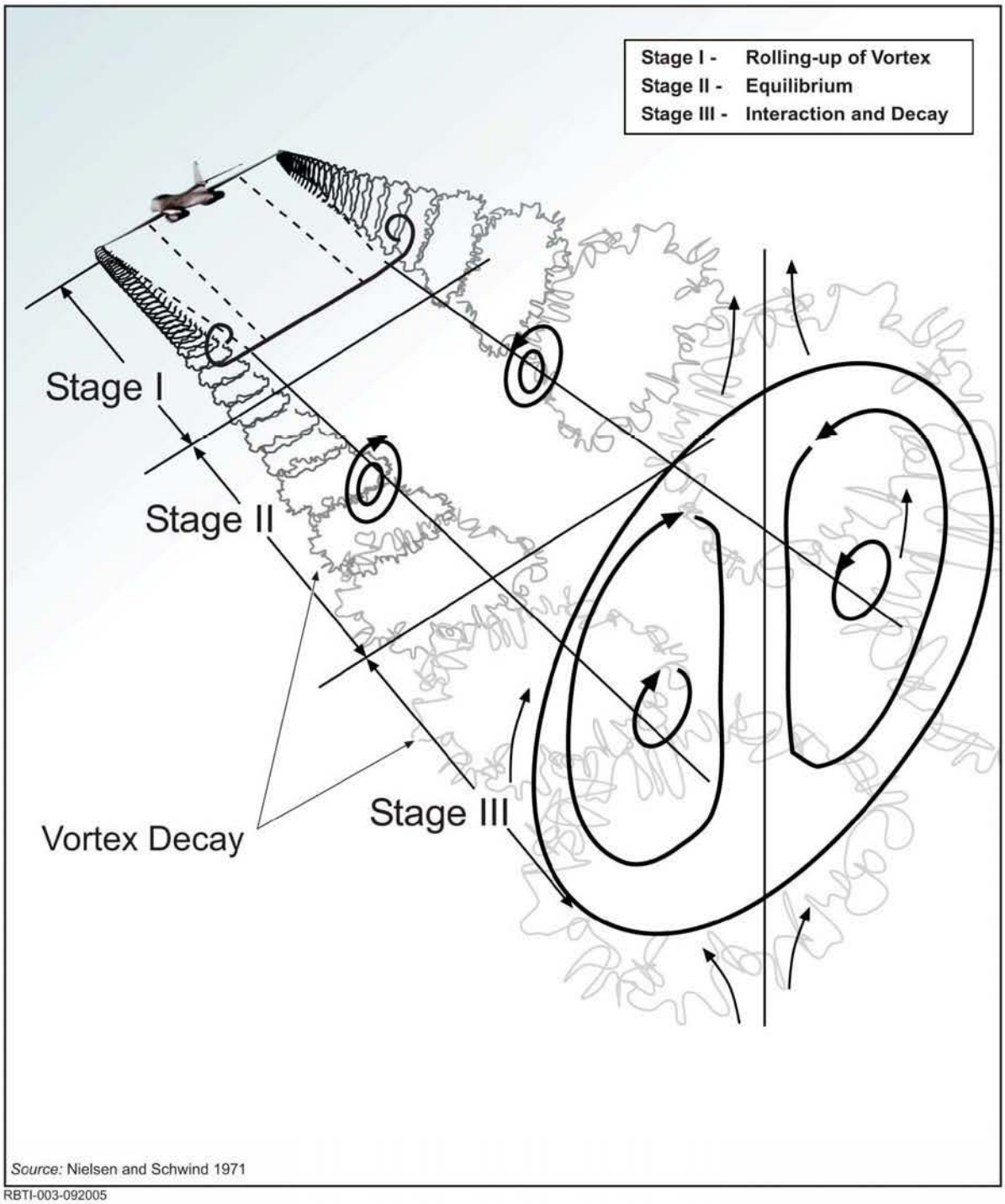


Figure S2-2
Stages of Development of Trailing Vortices behind an Aircraft

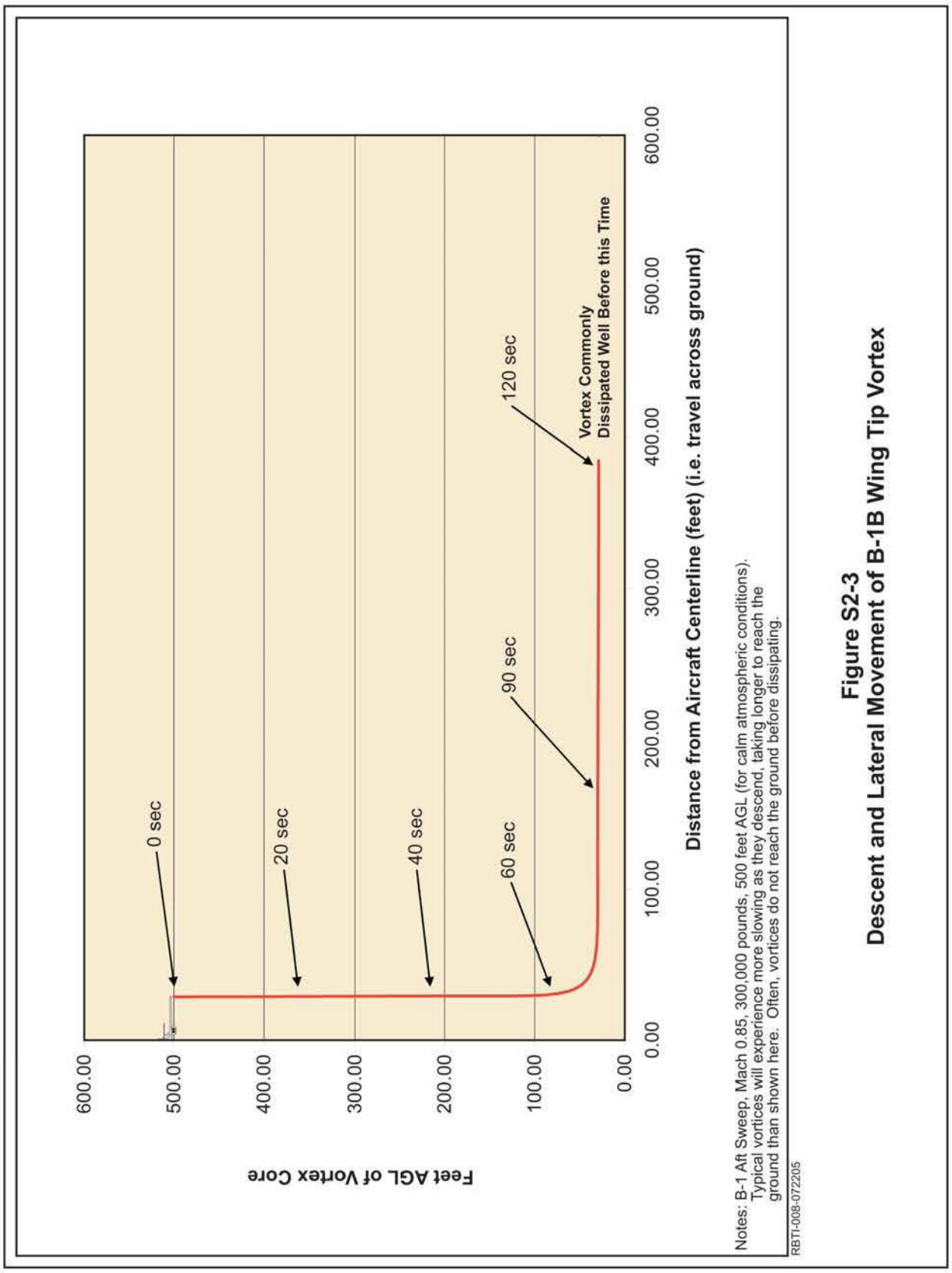


Figure S2-3
Descent and Lateral Movement of B-1B Wing Tip Vortex

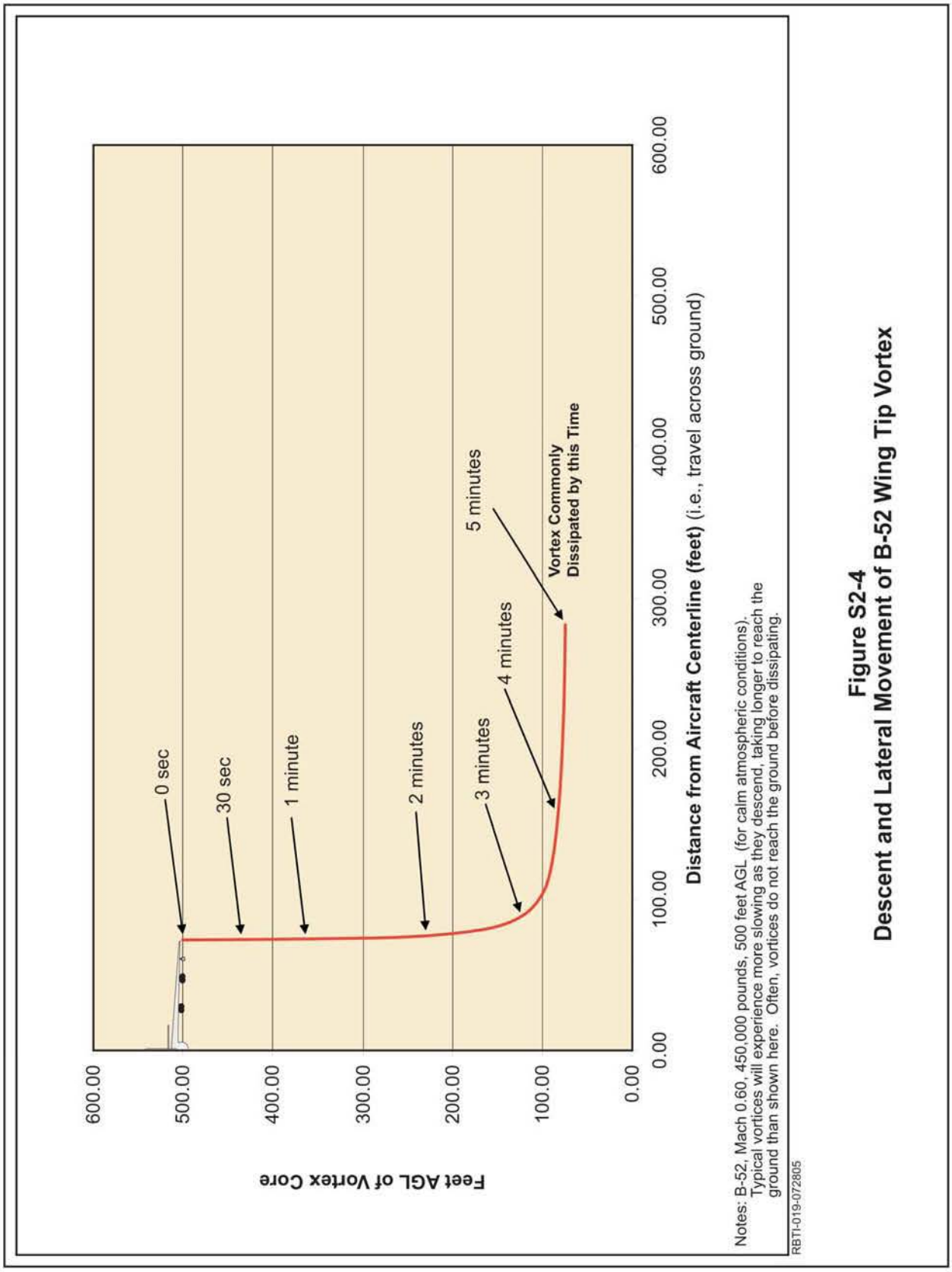


Figure S2-4
Descent and Lateral Movement of B-52 Wing Tip Vortex

However, crosswinds and other atmospheric influences can accelerate decay. Observations of actual wakes have shown significant variation in the distance to which they descend and in their duration under different degrees of atmospheric stability (Tombach 1970). Generally, when the vortices of conventional large aircraft, such as the B-52, sink close to the ground (within 100 to 200 feet), they tend to move laterally over the ground at a speed of 2 to 4 miles per hour (mph) (FAA 1991) (Figure S2-5). Due to the relatively small wing span of a B-1B when in aft sweep configuration, the lateral speed of its vortices reach 5 to 7 mph.

As the vortices are generated and descend, they extend behind the aircraft for varying distances dependent largely upon aircraft altitude and speed. Vortices can extend distances from a few wing-span lengths to a few miles behind the aircraft while descending to their minimum height (Jenkins and Meyer 1977). The radius of a vortex also varies and depends strongly on aircraft configuration and flight conditions. In addition, the radius depends on the rate of decay and influences of atmospheric conditions. By Stage III, the unorganized and decaying vortices can expand to intermingle with one another.

The core of the vortex, which contains the strongest velocities, descends to a minimum height above the ground (Appendix D). Minimum height directly relates to the span of the aircraft wing (i.e., about 1/3 of the wing span). For example, under normal cruise flight conditions as proposed under RBTI[2], the vortex core for a B-52 would not descend below 66 feet AGL, although much weaker and more disorganized vortex winds could extend to the surface. Because the wings on B-1Bs sweep back during normal MTR flight conditions, the minimum height for the vortex core would reach approximately 19 feet from the ground, with the vortex core continuing to weaken with time.

A major influence on vortices is atmospheric turbulence. As a result of winds, temperature, and humidity, atmospheric turbulence can displace and churn the air. Sunlight heats the ground and creates convection, also producing atmospheric turbulence. Atmospheric turbulence, characterized by small-scale winds that vary in speed and direction, consists of irregular air motions. Through this process, it disperses vapor, particulates, and even energy, throughout the atmosphere. Interaction of aircraft wake vortices with atmospheric turbulence disrupts, displaces, and weakens the vortices.

In summary, wake turbulence represents complex phenomena that form as concentrated vortices behind wing tips, rapidly descend, destabilize, and decay. The core of a vortex, as it decays, can only reach minimum height above the ground depending upon the wing span of the aircraft (the minimum height being approximately 1/3 of the wing span). In addition, many other factors, such as atmospheric turbulence, tend to reduce their strength and persistence, limiting their potential to affect trailing aircraft, ground structures, vehicles, or pose a hazard to people or animals on the surface.

[2] Based on operational estimates, normal cruise flight conditions for the B-52 are 450,000 pounds weight, 0.6 Mach speed, and relatively straight and level flight; for B-1Bs, these conditions are 300,000 pounds weight, 0.85 Mach speed, and relatively straight and level flight.

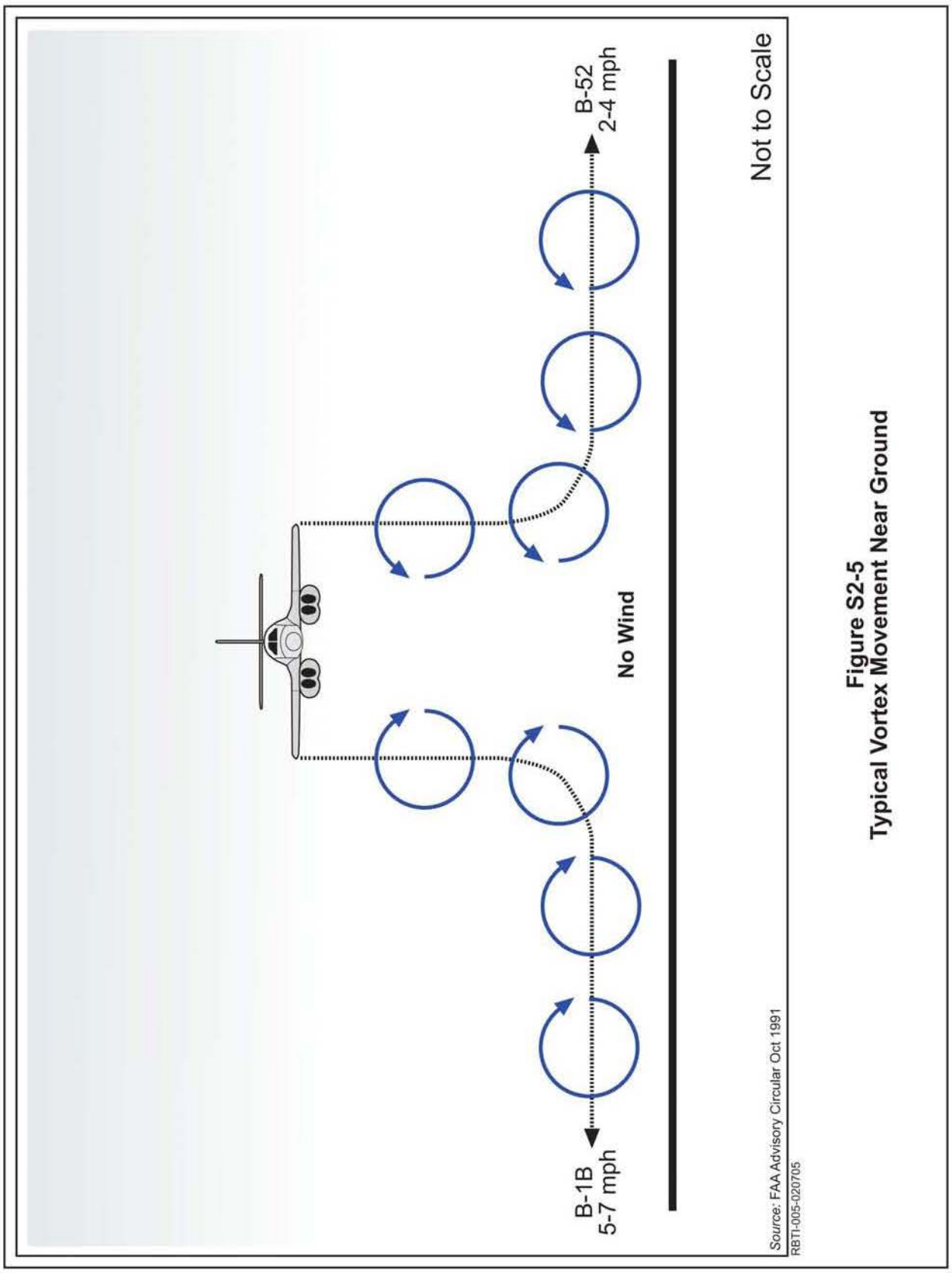


Figure S2-5
Typical Vortex Movement Near Ground

S2.4 Vortex Strength

Analysis Approach

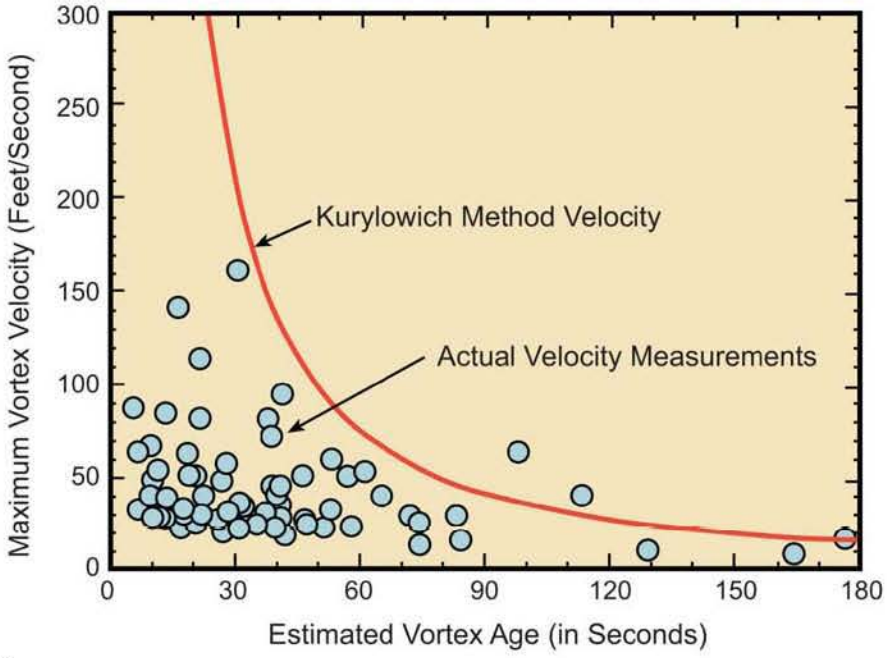
As detailed in section S2.3, the strength of the vortex as it emanates from a wing is governed primarily by the weight, speed, and shape of the wing of the generating aircraft. Other factors affecting vortex velocity include aircraft maneuvering, natural winds, and atmospheric turbulence. While maneuvering by the aircraft can affect vortex strength, B-52s and B-1Bs do not perform substantial maneuvering on MTRs. However, as discussed below, infrequent climbs by B-1B aircraft can influence vortex strength.

For RBTI, the aircraft of concern consist of the B-52 and B-1B proposed to operate along IR-153 in northeast New Mexico or IR-178 in west Texas. To determine the strength of vortices generated by the aircraft, the Air Force's Flight Mechanics Branch, Engineering Directorate, Aeronautical Systems Center at Wright-Patterson AFB conducted an analysis (Appendix D). The wake vortex analysis conducted by the Air Force employed the methods used in the report, *A Method for Assessing the Impact of Wake Vortices on USAF Operations* AFFDL-TR-79-3060 (Kurylowich 1979). This report, the result of a multi-year study performed by the Air Force, provided the methodology necessary to address the effects of wing-tip vortices near the ground associated with RBTI and accounts for time-dependent vortex effects (Appendix D). In addition to this primary methodology, the analysis considered information from FAA experts, as well as other applicable studies.

The "Kurylowich" method, developed by the Air Force in 1979, remains the Air Force's standard approach utilized to calculate wake vortices velocity. Several factors support its use and reliability:

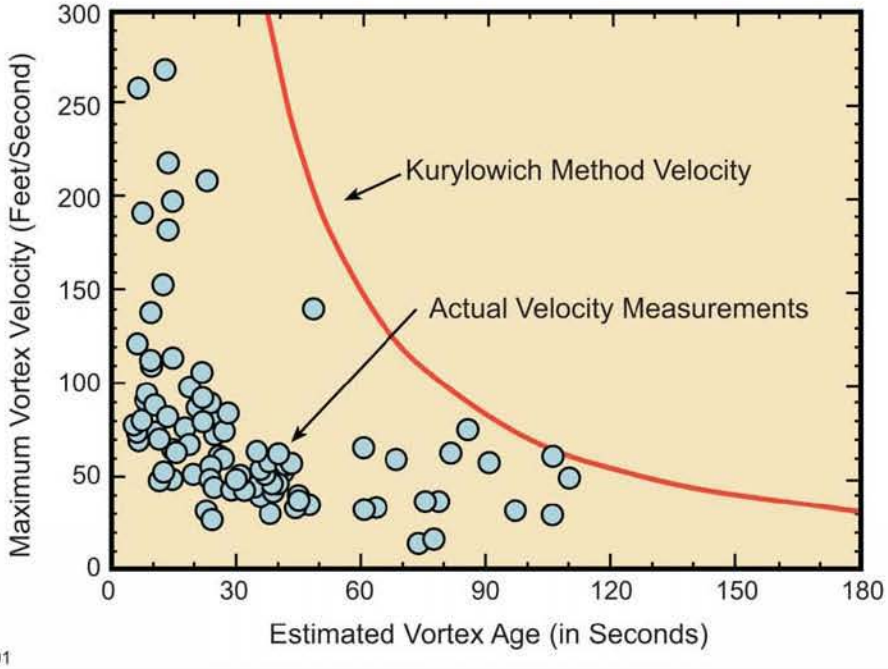
- Comparisons with other methodologies (e.g., Johnson and Teper 1974; Jenkins and Meyer 1977) showed the "Kurylowich" method to produce the most conservative results while maintaining realistic maximum core velocities.
- Checks of flight test data demonstrated the method reflects the range of vortex velocities generated by aircraft.
- The Air Force uses the method to address concerns related to a variety of wake vortex-induced mishaps with military aircraft and in defining successful paratroop drop formations in Iraq.
- Comparisons of actual wake vortex velocities measured on a tower for C-141[3] and C-5[4] transport aircraft to the predicted velocities using the "Kurylowich" method show that the predictions almost always yield higher velocities than the measured velocities (Figure S2-6 and S2-7).

[3] C-141 has a wing span of 160 feet and a nominal weight of 300,000 pounds
[4] C-5 has a wing span of 222 feet and a nominal weight of 600,000 pounds



Source: Rossow 2001

Figure S2-6
C-141 Wake Vortex Velocities From Tower Data Compared to Predictions from Kurylowich Model



Source: Rossow 2001

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Figure S2-7
C-5 Wake Vortex Velocities From Tower Data Compared to Predictions from Kurylowich Model

Other vortex analysis methodologies have been developed and considered (Jenkins and Meyer 1977; Rossow 2001; Greene, personal communication 2005), attempting to refine calculations and account for vortex behavior. One concern raised by some of these efforts centers on the inability of the "Kurylowich" method to decay vortex strength directly (i.e., the method assumes that the vortices do not decay). However, by assuming an increasing core radius with time, the method produces the net effect of reducing the maximum velocity with time (Skujins, personal communication 2005) in a manner which yields a reasonable prediction of the maximum velocity for the vortex under all but rare wind and climatic conditions (Jurkovich, personal communication 2005).

Additionally, the "Kurylowich" methodology does not specifically account for varying levels of atmospheric turbulence. The current method is representative of "nominal" turbulence conditions. In contrast, turbulence levels increase with winds and heating effects, vortex characteristics weaken dramatically through accelerated decay. Conversely, calm conditions with little to no wind and no atmospheric turbulence (which are rare occurrences in west Texas or northeast New Mexico [NOAA 1998 and Weather Underground Inc. 2005]) will yield vortex velocities higher than those predicted by the "Kurylowich" method.

While no vortex prediction method can analyze all possible climatic conditions and effects, the Air Force determined the "Kurylowich" methodology to be appropriate for this analysis. In using the method, the Air Force analyzed B-52 and B-1B flight scenarios for the proposed MTRs to determine the vortex strength at and near the ground. These scenarios focused on the lowest flight altitudes proposed for these aircraft along IR-178 and IR-153. The analysis employed altitudes of 300 and 500 feet AGL. Based on Air Force policy, 500 feet AGL is the typical minimum altitude either aircraft will fly, but on very limited occasions, an aircrew can be cleared to a minimum of 300 feet AGL. Since vortices produced above 500 feet AGL would have even less potential to reach or affect structures, objects, or animals on the ground, flight events above 500 feet AGL were not considered. In addition, vortices rarely descend more than 1,000 feet from their initial altitude, making calculations from 1,000 feet AGL or above irrelevant (Jenkins and Meyer 1977).

The MTR training operations for the B-52s and B-1Bs predominantly involve straight and level flight using a cruise power setting. For B-52s, a flight speed of Mach 0.6 applies, whereas B-1Bs would fly at Mach 0.85. Straight and level flight would be the norm for all B-52 operations and almost all B-1B training. Quick and sharp turns, radical climbs, or steep dives do not form part of the MTR training operations. However, for the purposes of terrain avoidance training, B-1B aircrews perform one to two planned rapid climbs and descents per sortie-operation, avoiding either actual terrain or a simulated obstacle. According to Dyess AFB personnel, these maneuvers can generate up to twice the force of gravity (2.0 G's). During these events known as "pull-ups," the potential exists to produce higher vortex velocities. Although rare and brief, these events also warranted analysis. Despite aircrews noting that

pull-ups produce up to 2.0 G's, this analysis uses a more conservative measure of 2.5 G's, the maximum G's allowed on a B-1B.

The model used in the analysis provided conservative calculations of the wake vortex strength, yielding higher wind speeds than would typically occur in reality for almost all atmospheric conditions (Appendix D). It excludes any acceleration of vortex decay and a reduction of vortex strength due to atmospheric conditions, wind, or other factors. As detailed previously, these influences can substantially affect vortices, causing them to dissipate or rebound, or in rare conditions, to last longer with higher wind speeds than predicted by the model. Two sets of rare atmospheric circumstances could increase vortex velocities above those defined by the "Kurylowich" method. First, if a vortex-induced gust interacted precisely with ambient wind blowing in the same direction, wind effects could conceivably be additive (Greene, personal communication 2005). Typically, however, the higher the ambient crosswind, the higher the turbulence levels. Since atmospheric turbulence forms a main cause of early vortex breakdown, a minor crosswind would dramatically accelerate the decay of the vortex structure. Crosswinds of only 22 mph, and possibly less, have been shown to dissipate vortices (Blackmore 2002).

Conditions characterized by calm (i.e., little to no) winds and no atmospheric turbulence resulting from heating and convection could also produce higher vortex velocities than those predicted by Kurylowich. Such uncommon vortex behavior is incompletely understood because the conditions under which it occurs are so rare (Greene, personal communication 2005). For example, average daily winds in west Texas and northeastern New Mexico range from 11 to 13 mph, with gusts of 29 to 85 mph occurring throughout the year (NOAA 1998). Similarly, sunny warm days common to both affected areas produce surface heating, convection, and turbulence. On average, sunny conditions are prevalent in these areas about 70 percent of the year (NOAA 2005).

Analysis Results

As the results indicate, the wake turbulence wind speed at ground level for a B-52 flying with standard training parameters at 300 feet AGL would be a gust of 3 mph (Scenario 3, Table S2-1). Due to the wing span of a B-52, the core of the vortex would not be expected to descend below the minimum height of 66 feet AGL (Figure S2-8). At that altitude, the velocity of the vortex gust would be 27 mph. Based on these data, B-52 operations at 500 feet AGL (Scenario 4) would produce even lower vortex velocities due to longer decay and descent times (Figure S2-9). For this scenario, the vortex core would reach approximately 64 feet AGL with a velocity of 21 mph. Such vortices would not likely reach the ground since it would take almost 3 minutes to descend to that level and they would commonly dissipate by then.

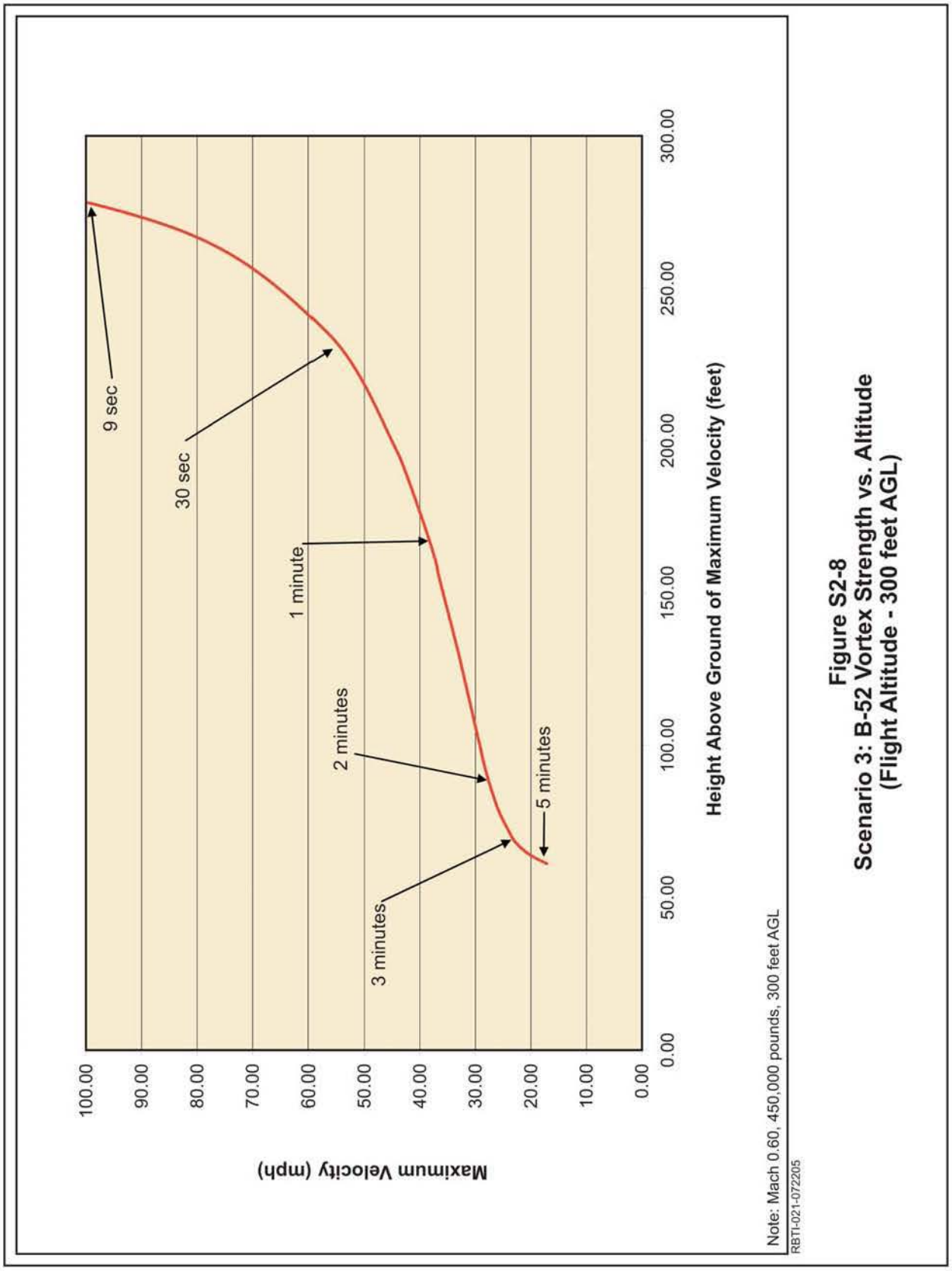

Figure S2-8
Scenario 3: B-52 Vortex Strength vs. Altitude
(Flight Altitude - 300 feet AGL)

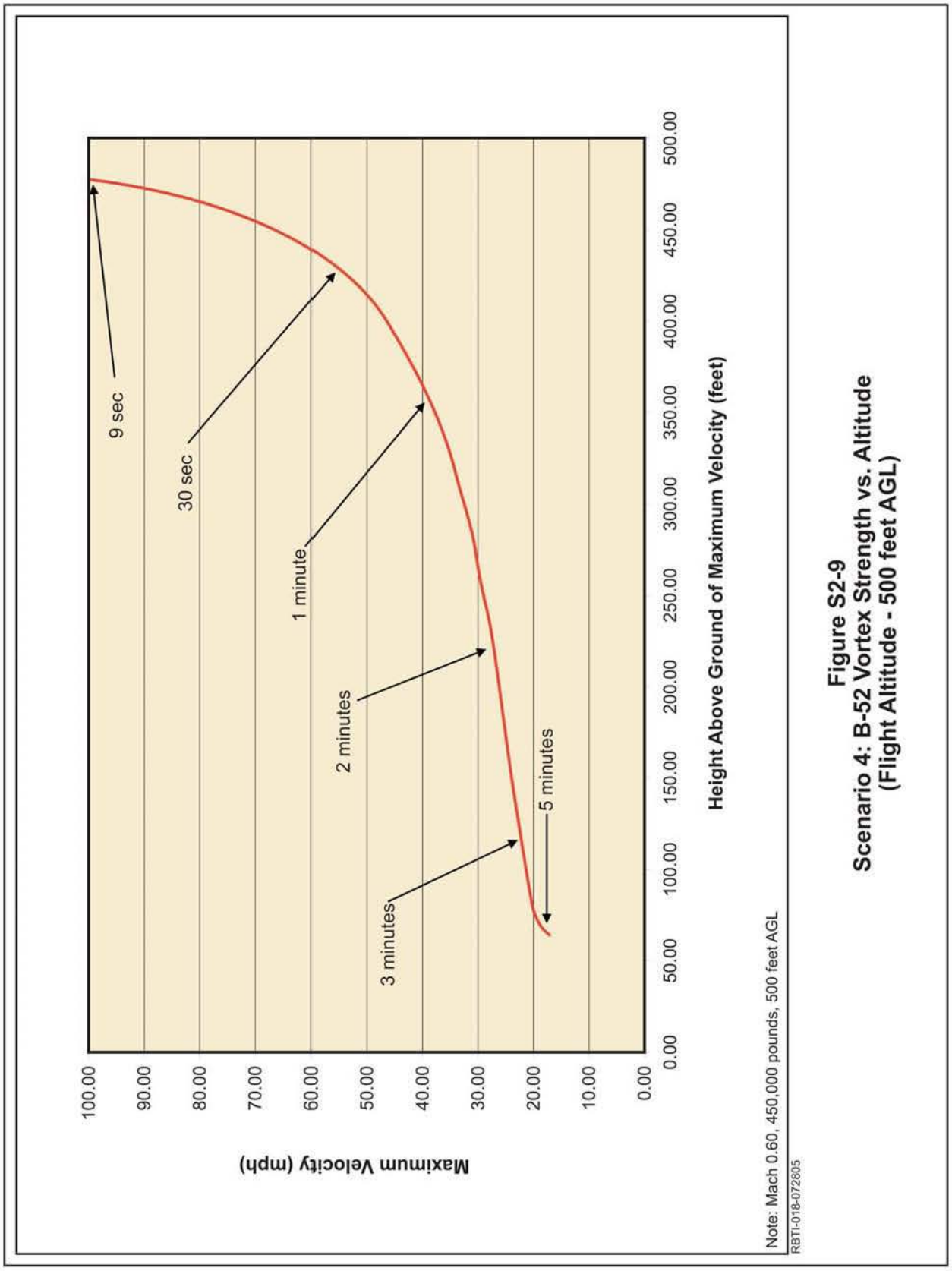

Figure S2-9
Scenario 4: B-52 Vortex Strength vs. Altitude
(Flight Altitude - 500 feet AGL)

Table S2-1 Analysis of Wake Vortex Strength Under Various Flight Scenarios							
Analysis Scenario	***Aircraft***	***Airspeed***	***Weight (lbs)***	***Flight Altitude (feet AGL)***	***Configuration***	***Vortex Wind Speed (mph)***	***Vortex Height Above Ground (feet)***
1	B-1B	Mach 0.85	300,000	500	Aft Wing Sweep	10	0 (surface)
1*	B-1B	Mach 0.85	300,000	500	Aft Wing Sweep	22*	19
2	B-1B	Mach 0.85	300,000	300	Aft Wing Sweep	10	0 (surface)
2*	B-1B	Mach 0.85	300,000	300	Aft Wing Sweep	27*	22
3*	B-52	Mach 0.6	450,000	300	Standard Cruise	27*	66
3	B-52	Mach 0.6	450,000	300	Standard Cruise	3	0 (surface)
4*	B-52	Mach 0.6	450,000	500	Standard Cruise	21*	64
4	B-52	Mach 0.6	450,000	500	Standard Cruise	<3	0 (surface)

*Vortex Core

In standard training mode, at either 300 or 500 feet AGL, a B-1B would generate a vortex wind speed of 10 mph at ground level. A B-1B would produce a vortex with a core velocity of 22 mph, and 27 mph at approximately 20 feet AGL for scenarios 1 and 2 respectively. Under rare calm atmospheric conditions, the vortices can decay more slowly, resulting in higher velocities than presented here. However, this is considered an extremely low probability especially considering the typical conditions experienced in the overflight area. The plots (Figure S2-10 and S2-11) show typical vortex profiles to 150 seconds duration, though as noted previously, most vortices dissipate before this time.

Under conditions where a B-1B performs a rapid climb, or pull-up, for terrain avoidance, the activity can generate higher vortex velocities. For example, with a maximum 2.5 G load factor from the pull-up, a B-1B flying at 500 feet AGL could produce a vortex velocity of 91.6 mph at 46 feet AGL (Figure S2-12). At 300 feet AGL, the vortex velocity could reach about 100 mph at approximately 25 feet AGL (Figure S2-13) In a little more than 30 seconds, either vortex will begin laterally moving above the ground and decay more quickly than shown in Figures S2-12 and S2-13. The potential for such occurrences would be low for several reasons. First, aircrews perform only one to two pull-up maneuvers per sortie-operation on the MTR (Dyess AFB personnel 2005). Second, not all pull-ups start at altitudes of 500 feet AGL or lower. Third, the load factor on these maneuvers would range from slightly greater than 1.0 G to 2.0 G's with a possible maximum of 2.5 G's. Lesser load factors would yield lower vortex velocity. Lastly, B-1Bs would fly 56 percent (868 annual sortie operations) of the operations on any of the proposed MTRs. Combined, these factors limit the number of events potentially producing greater vortex velocities. It must also be noted that the defined wind speeds for these vortices represent momentary gusts. They do not comprise sustained winds like those depicted in many wind scales.

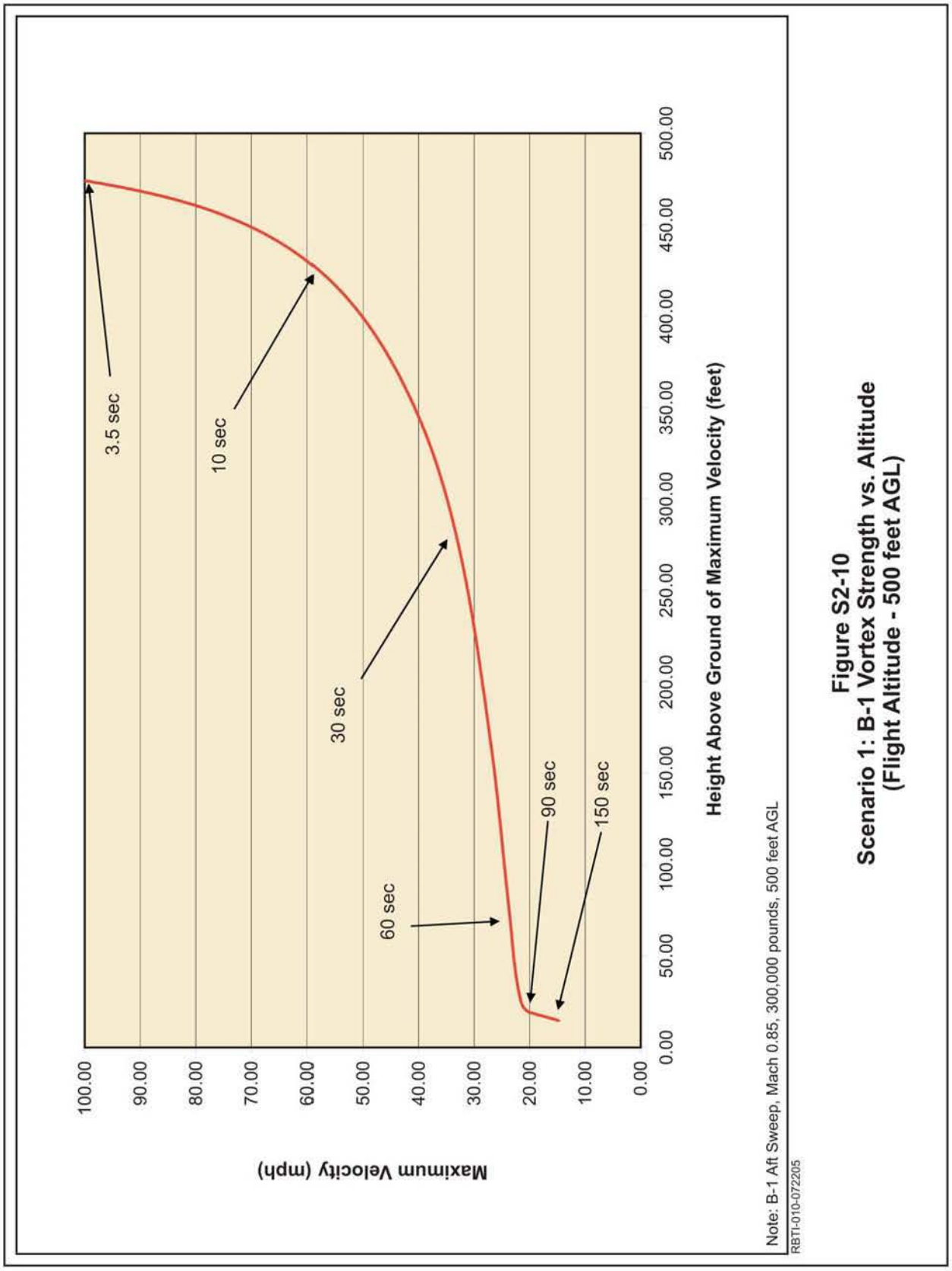

Figure S2-10
Scenario 1: B-1 Vortex Strength vs. Altitude
(Flight Altitude - 500 feet AGL)

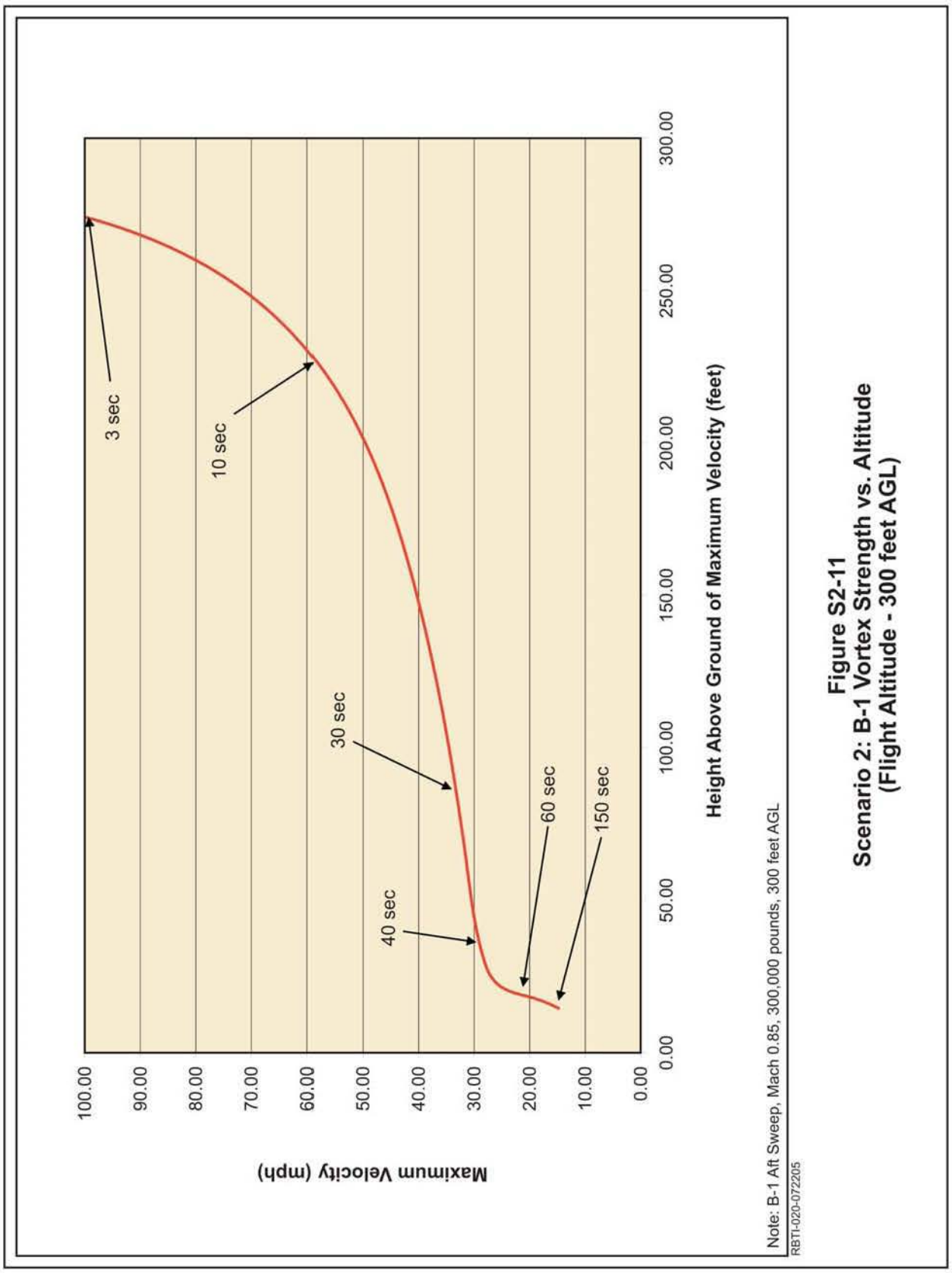

Figure S2-11
Scenario 2: B-1 Vortex Strength vs. Altitude
(Flight Altitude - 300 feet AGL)

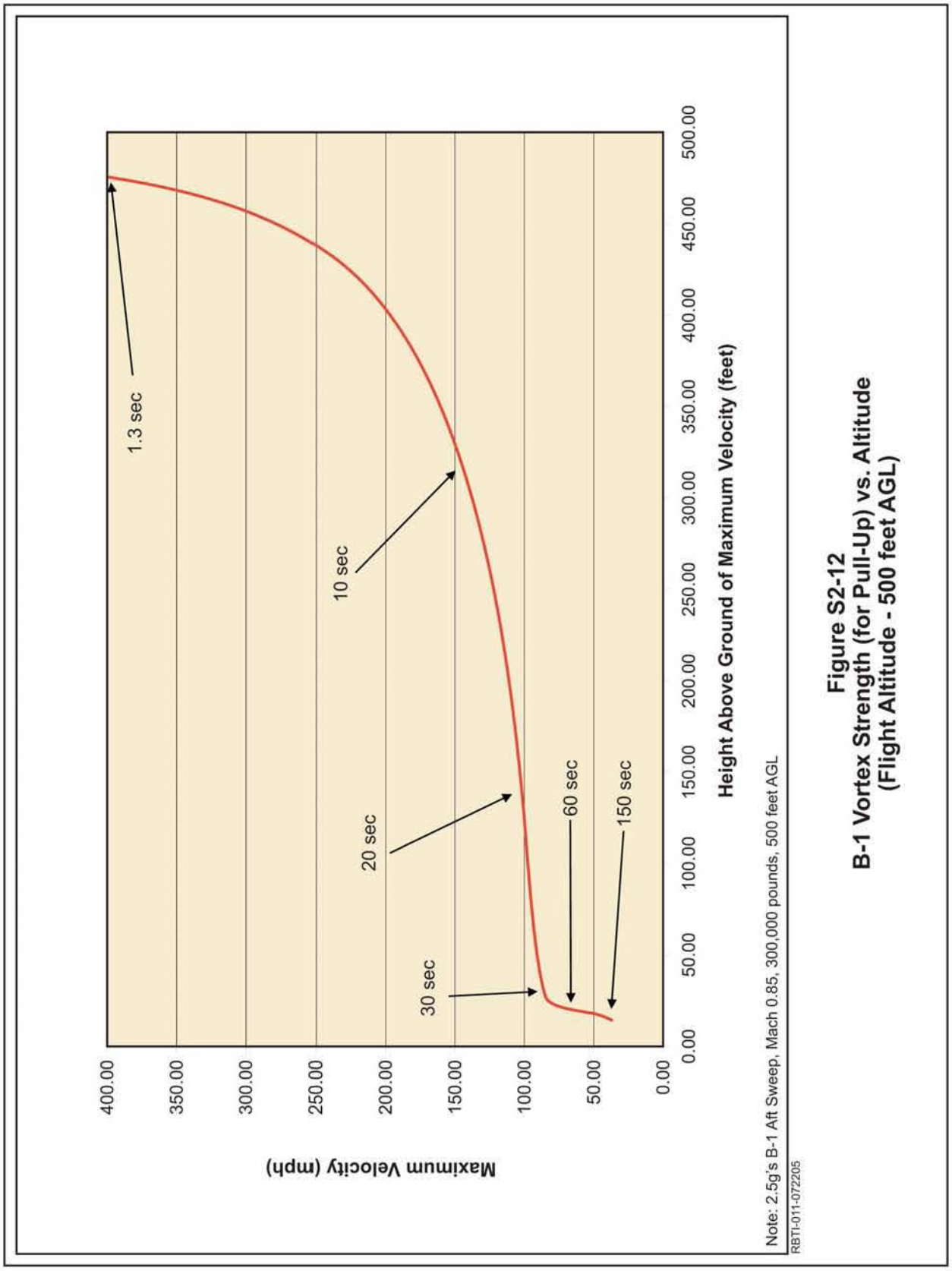

Figure S2-12
B-1 Vortex Strength (for Pull-Up) vs. Altitude
(Flight Altitude - 500 feet AGL)

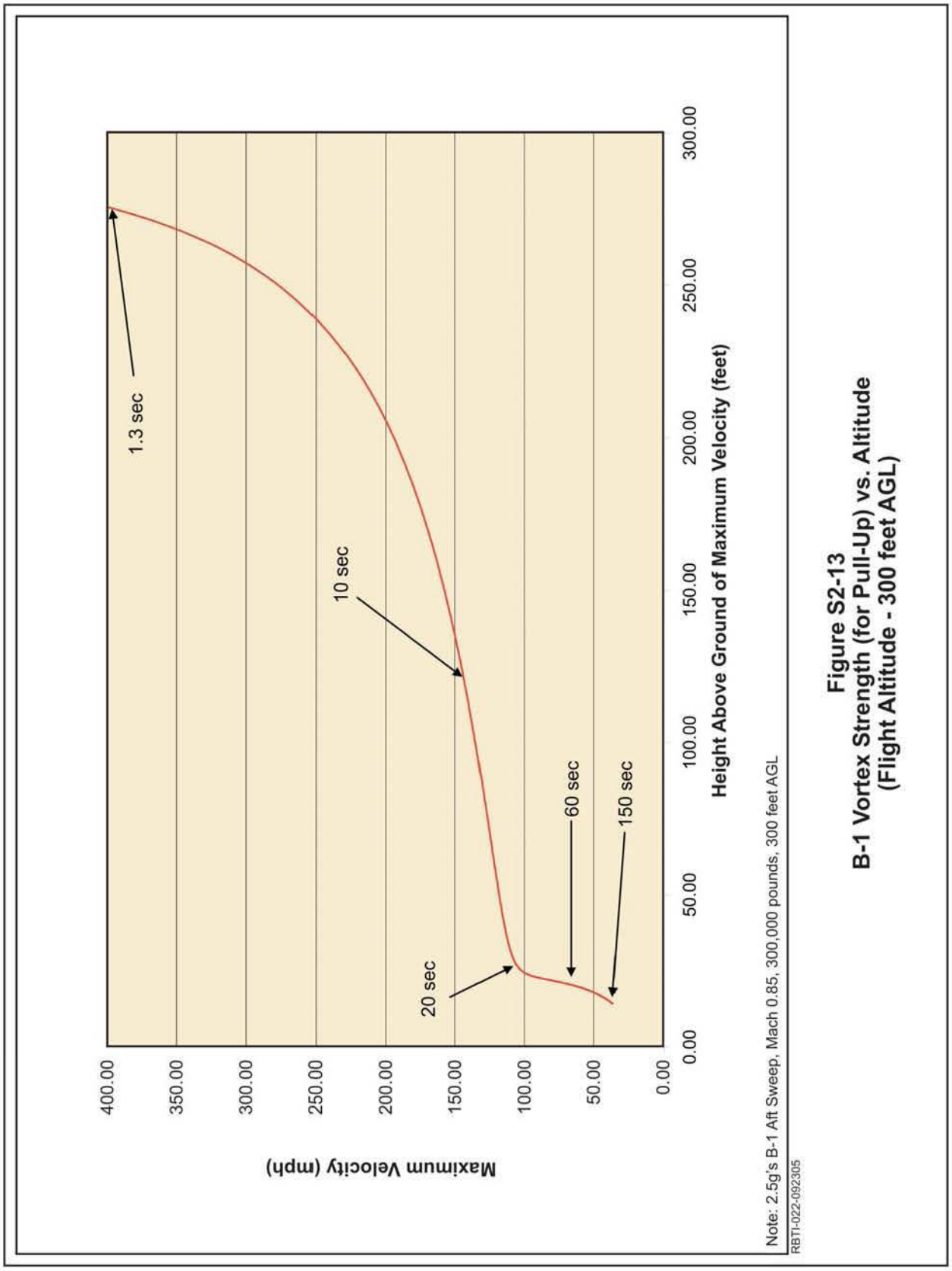

Figure S2-13
B-1 Vortex Strength (for Pull-Up) vs. Altitude
(Flight Altitude - 300 feet AGL)

S2.5 Potential Effects

The analysis conducted by the Air Force provided definitive information on the strength of the wing-tip vortices at ground level and near-ground level. To determine the potential for these vortices to affect structures, vehicles, persons, wildlife, and livestock, the Air Force:

- Compared the vortex velocities to the Beaufort Scale (Table S2-2) which defines the nature of wind effects for sustained wind speeds from 0 mph to greater than 72 mph, and common naturally occurring wind speeds in the affected areas of west Texas and northeastern New Mexico;
- Defined those portions, or segments, of the MTRs under Alternatives B, C, and D that permitted flight to altitudes (300 to 500 feet AGL) where vortices might have a potential effect;
- Determined the amount of flight activity along those segments and its influence on vortices; and
- Estimated the number of structures (i.e., windmills) under those segments and the probability of overflight and effects by vortices.

Table S2-2 Beaufort Wind Scale and Effects on Land and Structures

Sustained Wind Speed (mph)	***Effects***
0-1	Calm; smoke rises vertically
1-3	Direction of wind shown by smoke drift, but not by wind vanes
4-7	Wind felt on face; leaves rustle; ordinary vanes move by wind
8-12	Leaves and small twigs in constant motion; wind extends light flag
13-18	Raises dust and loose paper; moves small branches
19-24	Small trees with leaves begin to sway; crested wavelets form on inland waters
25-31	Large branches in motion; whistling heard through some overhead wires; umbrellas used with difficulty
32-38	Whole trees in motion; inconvenience felt when walking against the wind
39-46	Breaks twigs off trees; generally impedes walking progress
47-54	Slight structural damage occurs; mostly affecting chimneys and roof tiles or slates (not composite or shingles)
55-63	Trees uprooted; considerable structural damage occurs
64-72	Widespread damage
72+	Hurricane

Comparison to Wind Scales and Naturally-Occurring Winds. Comparison of the vortex analysis results associated with the B-52s and B-1Bs operating at low altitudes along proposed IR-178 (Alternatives B and C) or IR-153 (Alternative D) to the Beaufort Scale indicates that in all but one rare scenario (i.e., pull-up by B-1B), the vortex strength would have no potential to cause structural damage at or near ground-level. For example, vortices under any analyzed scenario involving normal flight conditions could produce momentary ground-level gusts between 3 and 10 mph, resulting in no more than rustling trees and leaves. The scale identifies no damage to any structures or harm to people, wildlife, or livestock (Figure S2-14).

Scenario *		Altitude	Mach	Vortex Speed (mph)	Vortex Height
△ (yellow)	B-52	300 feet AGL	0.6	27	66 feet
△ (teal)	B-1B	300 feet AGL	0.85	27	22 feet
△ (red)	B-1B	500 feet AGL	0.85	22	19 feet
△ (blue)	B-1B	500 feet AGL	0.85	10	Surface
△ (blue)	B-1B	300 feet AGL	0.85	10	Surface
△ (blue)	B-52	300 feet AGL	0.6	3	Surface

Source: Appendix D

* Scenario 4, B-52 at 500 feet AGL excluded due to lack of potential effects

RBTI-001-020705

Figure S2-14
Vortex Velocities Relative to Surface Objects

Under all standard operating conditions (Scenarios 1, 2, 3, and 4), the maximum velocities of vortex gusts would be 27 mph at 22 feet AGL and 27 mph at 66 feet AGL for the B-1B and B-52, respectively. Vortices from B-52s would not likely descend below 66 feet even under optimal conditions. For a B-1B flying at 300 feet AGL, a structure 65 feet tall could experience a momentary gust from a vortex on the order of 30 mph. Again, comparison to the Beaufort Scale indicates that none of these wind speeds would cause any damage to structures, vehicles, animals, or people.

Under the rare instance of a pull-up maneuver, vortex velocities could reach the levels of the category on the Beaufort Scale where structural damage could occur. Such damage could range from the loosening of roof tiles and potential effects on loose chimney bricks to more extensive roof, framework, or siding damage. However, to produce this damage, the wind speed would need to be sustained for more than the momentary gust caused by the vortex. A study of vortex effects at Heathrow Airport found that even higher velocities yielded only minor localized (i.e., a few square feet) damage to roof tiles (Blackmore 2002). Such effects were generated by landing large passenger aircraft. The study determined that regular, low-altitude overflights at slow speeds generate only a 0.2 percent occurrence rate for vortex damage (Blackmore 2002). Other factors limiting the potential for such effects include vortex dissipation due to natural wind, atmospheric turbulence, and ground clutter.

If the vortex-induced gusts occurred in concert with ambient wind, the effects could be additive and the potential for structural damage could increase. Typically, however, average daily crosswinds impart a greater atmospheric turbulence which increases the rate of vortex decay. Under extremely calm conditions, vortex velocity could reach higher levels and result in localized (i.e., a few square feet) damage potential like that noted in the Heathrow study (Blackmore 2002).

Other scales used to characterize wind effects such as those for tornados also support the Air Force's conclusion by demonstrating that much higher wind speeds are needed to cause structural damage. They consist of the Fujita Scale and the Enhanced Fujita Scale (Texas Tech University 2004). The Fujita Scale, developed in 1971, ranks the intensity and wind speeds of tornados from F0 (least intense) through F5 (most intense). Relative to this scale, the maximum vortex velocity generated under normal flying conditions, would fall below the lower end of the range for an F0 gust (45 to 78 mph) and cause no damage (Marineway 2005). Only at the next level F1 (wind gusts 73 to 112 mph) would moderate damage occur. As demonstrated by the analysis of the B-52 and B-1B vortices, no scenario under normal flying conditions would produce wind speeds near to F1 levels and wing-tip vortices lack the power and the mass of a tornado. In the rare instance of a pull-up by a B-1B, momentary gust levels could reach into the F0 or F1 levels. These levels, if sustained, could damage roofs, mobile homes, trees, and automobiles (Marineway 2005). Given all the limiting factors described previously, vortices would not likely produce sufficiently sustained wind gusts to approximate these conditions except under rare conditions.

Recently, engineers at Texas Tech University presented an Enhanced Fujita Scale (Texas Tech University 2004) designed to better link damage to wind speed, improve tornado rating, and prevent overestimates of tornado wind speeds common under the Fujita Scale. This analysis correlated between the Fujita Scale and the Enhanced Fujita Wind Scale, and determined that F0 wind gust levels actually ranged from 65 to 85 mph, or a minimum of 18 mph higher than any RBTI aircraft-generated vortex. In addition, this study defined the wind speeds associated with the threshold for damage to different structures and towers including farm outbuildings, family residences, manufactured homes, wooden power poles, and free-standing towers. All of the threshold wind speeds from a tornado (not a vortex) well exceeded the maximum vortex speed from the normal operations of the B-1Bs and B-52s along the MTRs.

As a second part of this analysis, the Air Force compared the projected vortex speeds with naturally-occurring winds in the affected region, particularly gusts that act similar to vortices. Using 5 years (1991 through 1995) of meteorological data from the two nearest reporting stations (Lubbock and Midland/Odessa, Texas) and 66 years (1930 through 1996) of data from the same stations, the analysis assessed average and peak wind speeds (NOAA 1998) for Alternatives B and C. For Alternative D, wind data for 66 years from Clayton, New Mexico was analyzed for average wind speeds (NOAA 1998) and from 2000 to 2005 for peak wind speeds (Weather Underground, Inc. 2005).

Although from various years, the wind measurements represent the best available information from the locations nearest the alternatives. These data establish that average daily naturally-occurring winds in west Texas and northeast New Mexico tend to be greater than wind speeds generated by most vortices from low-flying B-52s and B-1Bs operating under normal flight conditions. For all these vortices potentially reaching the surface, average naturally-occurring wind speeds either exceed or are similar to those produced by vortices (Table S2-3). Under standard flight scenarios, the vortex velocities (i.e., 22 and 27 mph) only exceed the average wind speeds by a maximum of 11 to 16 mph for Alternatives B and C, and a maximum of 10 to 15 mph for Alternative D. These differences are minor and establish that vortices would not measurably affect structures or objects more than average daily winds under typical flight conditions.

Table S2-3 Comparison of Vortex Velocities and Natural Average and Annual Peak Wind Speeds

Aircraft	*Flight Altitude (feet AGL)*	*Vortex Wind Speed (mph)*	*Vortex Height Above Ground (feet)*	*Lubbock Average Daily Wind Speed (mph)*	*Midland/ Odessa Average Daily Wind Speed (mph)*	*Clayton Average Daily Wind Speed (mph)*	*Lubbock Peak Gust Range (mph)*	*Midland/ Odessa Peak Gust Range (mph)*	*Clayton Peak Gust Range (mph)*
B-1B	500	10	0 (surface)	13	11	12	52-85	47-82	29-61
B-1B	500	22	19	13	11	12	52-85	47-82	29-61
B-1B	300	10	0 (surface)	13	11	12	52-85	47-82	29-61
B-1B	300	27	22	13	11	12	52-85	47-82	29-61
B-52	300	27	66	13	11	12	52-85	47-82	29-61
B-52	300	3	0 (surface)	13	11	12	52-85	47-82	29-61

Source: NOAA 1998, Weather Underground, Inc. 2005

Wake turbulence vortices are more comparable to a wind gust, so examination of peak gust data provides a context for evaluating the potential effects. Clearly, peak gusts from natural winds exceed all potential vortex velocities for normal flying conditions, and do so frequently (refer to Table S2-3). Nearly every day in the affected areas of west Texas and northeast New Mexico gusts in excess of 27 mph occur, the highest gust velocity for surface winds generated by aircraft vortices. Wind gusts of 27 mph or greater affect the west Texas area on close to 80 percent of the days in a year (NOAA 1998), and 85 percent of the days in northeast New Mexico. As such, natural winds equal or exceed the vortex strength near the surface that would result under typical training profiles. On approximately 9 to 12 days per year, naturally-occurring wind gusts in west Texas exceed 50 mph, and approximately 8 to 9 days per year in the proposed New Mexico area (Appendix D). Some of these naturally-occurring gusts in west Texas could reach speeds of 85 mph, or 58 mph more than the maximum vortex and at the top of the range for an F0 tornado. Naturally-occurring gusts in northeast New Mexico reach speeds of 61, or 34 mph more than the vortex maximum from B-1Bs and B-52s under normal flying conditions.

As noted previously, pull-ups by B-1Bs could generate vortex levels equal to or higher than peak wind gusts in the areas of Alternatives B, C, or D. However, such events would be infrequent.

Moreover, the daily average winds and the higher gusts would cause rapid dissipation and decay of wake vortices, rendering their strength much less than the Air Force modeling yielded. Given this factor and that the naturally-occurring average winds and wind gusts exceed those potentially generated by aircraft vortices, the latter would be less likely to affect ground structures, persons, objects, and animals than the former.

MTR Segments. Previous discussion demonstrated that B-1Bs and B-52s above 500 feet AGL would not generate vortices sufficient to reach the ground. As such, this analysis narrowed the potentially affected area along the MTRs to segments allowing flight at 300, 400, or 500 feet AGL. Table S2-4 lists these segments for Alternatives B, C, and D and the MTR segment floor altitude.

To put this in perspective, Table S2-5 defines the number and percentage of segments at 300, 400, and 500 feet AGL in each alternative. In Alternative B and C, IR-178 would contain 19 such segments representing roughly 46 and 54 percent of the total MTR segments, respectively. For Alternative D, approximately 76 percent of the segments in IR-153 would fall into this category. These data have several implications for the potential for impacts from vortices:

- A total of 54, 46, and 24 percent of the segments within Alternatives B, C, and D, respectively, would not be subject to potential effects from vortices.
- Since the vortices for B-52s generated above 300 feet AGL pose virtually no potential to affect the surface, roughly 85, 83, and 82 percent of the segments in Alternatives B, C, and D can be eliminated from concern for vortices from B-52s.

- Even for that proportion of segments permitting flight below 500 feet AGL, use of those altitudes would remain limited because: few aircrews receive authorization to fly below 500 feet AGL; B-1B aircrews would fly at these altitudes only 5 percent of the time; and B-52 aircrews would fly at or below 500 feet AGL between 0 and 5 percent of the time, if at all.

Table S2-4 Segments of Proposed MTRs Permitting Flight at 300, 400, and 500 feet AGL

	Alternative B - IR-178 (41 Total Segments)				*Alternative C - IR-178 (35 Total Segments)*				*Alternative D - IR-153 (38 Total Segments)*		
	MTR Segment	*Altitude (feet AGL)*	*Width (nm)*		*MTR Segment*	*Altitude (feet AGL)*	*Width (nm)*		*MTR Segment*	*Altitude (feet AGL)*	*Width (nm)*
1	AB	400	12	1	AB	400	12	1	AB	400	8
2	BC	400	12	2	BC	400	12	2	BC	400	4
3	CD	400	12	3	CD	400	12	3	DE	400	8
4	DE	400	12	4	DE	400	12	4	EF	400	8
5	EF	400	12	5	EF	400	12	5	FG	400	12
6	FG	300[1]	14	6	FG	300[2]	14	6	GH	400	8
7	GH	300[1]	14	7	GH	300[2]	14	7	HI	400	15
8	HI	300[1]	14	8	HI	300[2]	14	8	IJ	400	10
9	IJ	300[1]	14	9	IJ	300[2]	14	9	JK	400	10
10	JK	300[1]	14	10	JK	300[2]	14	10	KL	300[2]	10
11	KL	300[1]	14	11	KL	300[2]	14	11	LM	300[2]	10
12	NO	400	14	12	NO	400	14	12	MN	300[2]	14
13	RS	400	14	13	RS	400	14	13	NO	300[2]	14
14	ST	400	14	14	ST	400	14	14	OP	300[2]	14
15	TU	500	14	15	TU	500	14	15	PQ	300[2]	10
16	WX	500	8	16	WX	500	8	16	QR	300[2]	14
17	XY	500	8	17	XY	500	8	17	RS	400	6
18	YZ	500	8	18	YZ	500	8	18	ST	400	6
19	ZAA	500	6	19	ZAA	500	6	19	TU	400	6
								20	UV	400	14
								21	VW	400	14
								22	WX	400	12
								23	XY	400	12
								24	YZ	400	8
								25	ZAA	400	8
								26	AAAB	400	8
								27	ABAC	400	8
								28	ADAE	400	8
								29	AEU	400	8

[1] Appendix C of the RBTI Final EIS lists these segments at 200 feet AGL. Consistent with a management action described in the RBTI Final EIS (page 2-70) and the Air Force ROD of 2000, these segments have floor altitudes of 300 feet AGL.

[2] Appendix C of the RBTI Final EIS lists these segments at 200 feet. However, as described in Chapter 2 of the RBTI Final EIS (see, e.g., page 2-3), the RBTI proposed action would not involve flights below 300 feet AGL. In addition, the management actions described in Chapter 2 of the RBTI Final EIS (page 2-70) include raising the floor of MTR segments to a minimum of 300 feet AGL for Alternatives B, C, and D.

Table S2-5 Percentage of Segments at 300 to 500 feet AGL per Alternative

	Alternative B: IR-178		*Alternative C: IR-178*		*Alternative D: IR-153*	
	# Segments	*% of Total*	*# Segments*	*% of Total*	*# Segments*	*% of Total*
Total Segments in MTR	41	100%	35	100%	38	100%
Segments at 500 feet AGL	5	12.2%	5	14.3%	0	0.0%
Segments at 400 feet AGL	8	19.5%	8	22.8%	22	57.9%
Segments at 300 feet AGL	6	14.6%	6	17.1%	7	18.4%
Total MTR Segments 300-500 feet AGL	**19**	**46.3%**	**19**	**54.3%**	**29**	**76.3%**

All of these factors would reduce the number of vortices generated at low altitudes. Vortices from both normal flying conditions and the rare pull-ups would be affected. As such, the potential for vortex-related effects on ground structures, objects, animals, and people would likewise be reduced measurably.

Flight Activity on MTRs. With the potentially affected area reduced to a set of segments for each alternative, this assessment next defined the amount of flight activity (i.e., sortie-operations) on those segments. Also, the types of aircraft proposed for these sortie-operations comprised an important consideration since different aircraft produce different vortex strengths.

Tables S2-6, S2-7, and S2-8 present the sortie-operations for the affected segments by aircraft type for Alternatives B, C, and D, respectively. The data reflect the total number of sortie-operations by aircraft type based on the Air Force's management action presented in the RBTI Final EIS (Air Force 2000a) and original ROD (Air Force 2000b). In the RBTI Final EIS, the Air Force chose to limit the annual sortie-operations on the proposed MTRs to 1,560 instead of the originally proposed 2,660 annual sortie-operations. The number of sortie-operations per aircraft type and segment are proportional to that originally proposed.

Table S2-6 Sortie-Operations by Low Altitude Segment: Alternative B: IR-178

	MTR Segment	***Altitude (feet AGL)***	***Sortie-Operations by Aircraft Type***			
			B-1B	*B-52*	*Other*	*Total*
1	AB	400	868	575	117	1560
2	BC	400	868	575	117	1560
3	CD	400	868	575	117	1560
4	DE	400	868	575	117	1560
5	EF	400	868	575	117	1560
6	FG	300	868	575	117	1560
7	GH	300	868	575	117	1560
8	HI	300	868	575	117	1560
9	IJ	300	868	575	117	1560
10	JK	300	868	575	117	1560
11	KL	300	868	575	117	1560
12	NO	400	809	536	109	1454
13	RS	400	591	391	80	1062
14	ST	400	591	391	80	1062
15	TU	500	758	502	102	1362
16	WX	500	706	467	95	1269
17	XY	500	491	325	66	883
18	YZ	500	491	325	66	883
19	ZAA	500	129	85	17	232

Table S2-7 Sortie-Operations by Low Altitude Segment: Alternative C: IR-178						
	MTR Segment	***Altitude (feet AGL)***	***Sortie-Operations by Aircraft Type***			
			B-1B	*B-52*	*Other*	*Total*
1	AB	400	868	575	117	1560
2	BC	400	868	575	117	1560
3	CD	400	868	575	117	1560
4	DE	400	868	575	117	1560
5	EF	400	868	575	117	1560
6	FG	300	868	575	117	1560
7	GH	300	868	575	117	1560
8	HI	300	868	575	117	1560
9	IJ	300	868	575	117	1560
10	JK	300	868	575	117	1560
11	KL	300	868	575	117	1560
12	NO	400	809	536	109	1454
13	RS	400	591	391	80	1062
14	ST	400	591	391	80	1062
15	TU	500	758	502	102	1362
16	WX	500	706	467	95	1269
17	XY	500	491	325	66	883
18	YZ	500	491	325	66	883
19	ZAA	500	129	85	17	232

Table S2-8 Sortie-Operations by Low Altitude Segment: Alternative D: IR-153						
	MTR Segment	***Altitude (feet AGL)***	***Sortie-Operations by Aircraft Type***			
			B-1B	*B-52*	*Other*	*Total*
1	AB	400	868	575	117	1560
2	BC	400	868	575	117	1560
3	DE	400	868	575	117	1560
4	EF	400	868	575	117	1560
5	FG	400	868	575	117	1560
6	GH	400	868	575	117	1560
7	HI	400	868	575	117	1560
8	IJ	400	868	575	117	1560
9	JK	400	868	575	117	1560
10	KL	300	803	532	108	1443
11	LM	300	803	532	108	1443
12	MN	300	803	532	108	1443
13	NO	300	803	532	108	1443
14	OP	300	803	532	108	1443
15	PQ	300	803	532	108	1443
16	QR	300	803	532	108	1443
17	RS	400	803	532	108	1443
18	ST	400	803	532	108	1443
19	TU	400	803	532	108	1443
20	UV	400	454	300	61	815
21	VW	400	454	300	61	815
22	WX	400	454	300	61	815
23	XY	400	454	300	61	815
24	YZ	400	454	300	61	815
25	ZAA	400	454	300	61	815
26	AAAB	400	70	46	9	126
27	ABAC	400	70	46	9	126
28	ADAE	400	70	46	9	126
29	AEU	400	70	46	9	126

B-1B sortie-operations dominate for all alternatives, accounting for 56 percent of the total for each segment; B-52 sortie-operations contribute 37 percent. Other miscellaneous aircraft (e.g., F-16s) form 7 percent of the sortie-operations on these low-altitude segments. As shown above, analysis of B-52 vortices revealed insufficient velocities at ground level (i.e., 3 mph) to result in effects, those sortie-operations can be discounted. Similarly, flights by the smaller, lighter "other" aircraft would not produce vortices of a sufficient velocity (Skujins, personal communication 2005). With their elimination, the focus of the analysis centered on B-1B activities.

Because the fewer the sortie-operations the fewer vortices at or near ground level, the number of sortie-operations per segment indicate a reduced potential for vortex impacts. As the data in Tables S2-6, S2-7, and S2-8 demonstrate, a substantial number of segments in each alternative would support fewer B-1B sortie-operations than the maximum (i.e., 868).

Another component of the flight activities that helps to define the context for vortices relates to the actual amount of time flown at the 300 to 500 feet AGL altitudes. On average, based on the durations of sortie-operations on the alternative MTRs (Air Force 2000a) and the amount of time at different altitudes, B-1Bs would fly at 300 to 500 feet AGL for about 3 to 3.5 minutes per sortie-operation.

That these amounts of time are brief indicate that the potential for generating vortices affecting the ground would be limited. Furthermore, dispersal of these brief periods of low-altitude flight across the MTRs would reduce the potential for vortices to affect a single location repeatedly.

Estimated Structures. The Fifth Circuit Court of Appeals opinion stated that the Air Force failed to sufficiently analyze the effects of wake vortices on ground structures. Previously, this analysis demonstrated that for all but rare wind and atmospheric conditions, B-1Bs and B-52s, flying under normal flight parameters, along the proposed alternative MTRs, would not generate vortex velocities sufficient to damage ground structures. Indeed, naturally-occurring average daily winds or peak wind gusts would match or exceed such vortex velocities. Under rare atmospheric conditions vortex velocities can exceed those defined by the "Kurylowich" method, with the potential to momentarily exceed daily peak wind gusts. Based on previous data (Blackmore 2002), the potential for damage would be quite low, and if effects did occur, they would be localized and small-scale (i.e., a few square feet).

Previous analysis also indicated that infrequent pull-up maneuvers by B-1Bs could produce much higher vortex velocities (i.e., 92 mph). Using standards from the Beaufort and Fujita scales, these velocities fall within a range capable of damaging ground structures.

Therefore, this analysis considers the probability of vortices from such maneuvers interacting with ground structures. In the affected areas of west Texas and northeastern New Mexico, the tallest structures tend to consist of ranch/farm windmills. Although they vary in height, the windmills commonly are taller than

other structures like barns and houses. As such, windmills would extend to greater heights, increasing the potential for interaction with vortices.

In conducting the analysis, the Air Force first acquired available data on windmill locations from U.S. Geological Survey website sources (USGS 2005). While these data undoubtedly lack some windmill locations and include others no longer extant, they represent the best available documentable information on the topic. The windmills along the proposed MTRs for Alternatives B, C, and D are depicted in Figures S2-15, S2-16, and S2-17, respectively. Table S2-9 lists the windmills under each segment for the three action alternatives.

Table S2-9 Windmills Located Under Alternatives B, C, and D

Alternative B IR-178 and Alternative C IR-178				***Alternative D IR-153***			
Segment	*Altitude*	*Width*	*Windmills*	*Segment*	*Altitude*	*Width*	*Windmills*
AB	400	12	3	AB	400	8	0
BC	400	12	3	BC	400	4	0
CD	400	12	0	DE	400	8	0
DE	400	12	6	EF	400	8	0
EF	400	12	1	FG	400	12	0
FG	300	14	0	GH	400	8	0
GH	300	14	0	HI	400	15	3
HI	300	14	0	IJ	400	10	0
IJ	300	14	0	JK	400	10	2
JK	300	14	1	KL	300	10	4
KL	300	14	4	LM	300	10	0
NO	400	14	7	MN	300	14	4
RS	400	14	8	NO	300	14	2
ST	400	14	3	OP	300	14	4
TU	500	14	21	PQ	300	10	11
WX	500	8	0	QR	300	14	4
XY	500	8	5	RS	400	6	3
YZ	500	8	15	ST	400	6	7
ZAA	500	6	0	TU	400	6	8
				UV	400	14	31
				VW	400	14	7
				WX	400	12	4
				XY	400	12	16
				YZ	400	8	1
				ZAA	400	8	0
				AAAB	400	8	0
				ABAC	400	8	3
				ADAE	400	8	13
				AEU	400	8	5

This analysis once again focused on those low-altitude segments permitting flight at 300 to 500 feet AGL. For Alternatives B and C, 7 out of 19 low-altitude segments lack any windmills, thereby eliminating the potential for impact. A total of 11 segments include between 1 and 8 windmills, and only 2 segments contain more (i.e., 15 and 21). For Alternative D, 10 of 29 segments lack windmills, whereas 15 segments contain 9 or less. A total of 4 segments contain between 11 and 31 windmill locations.

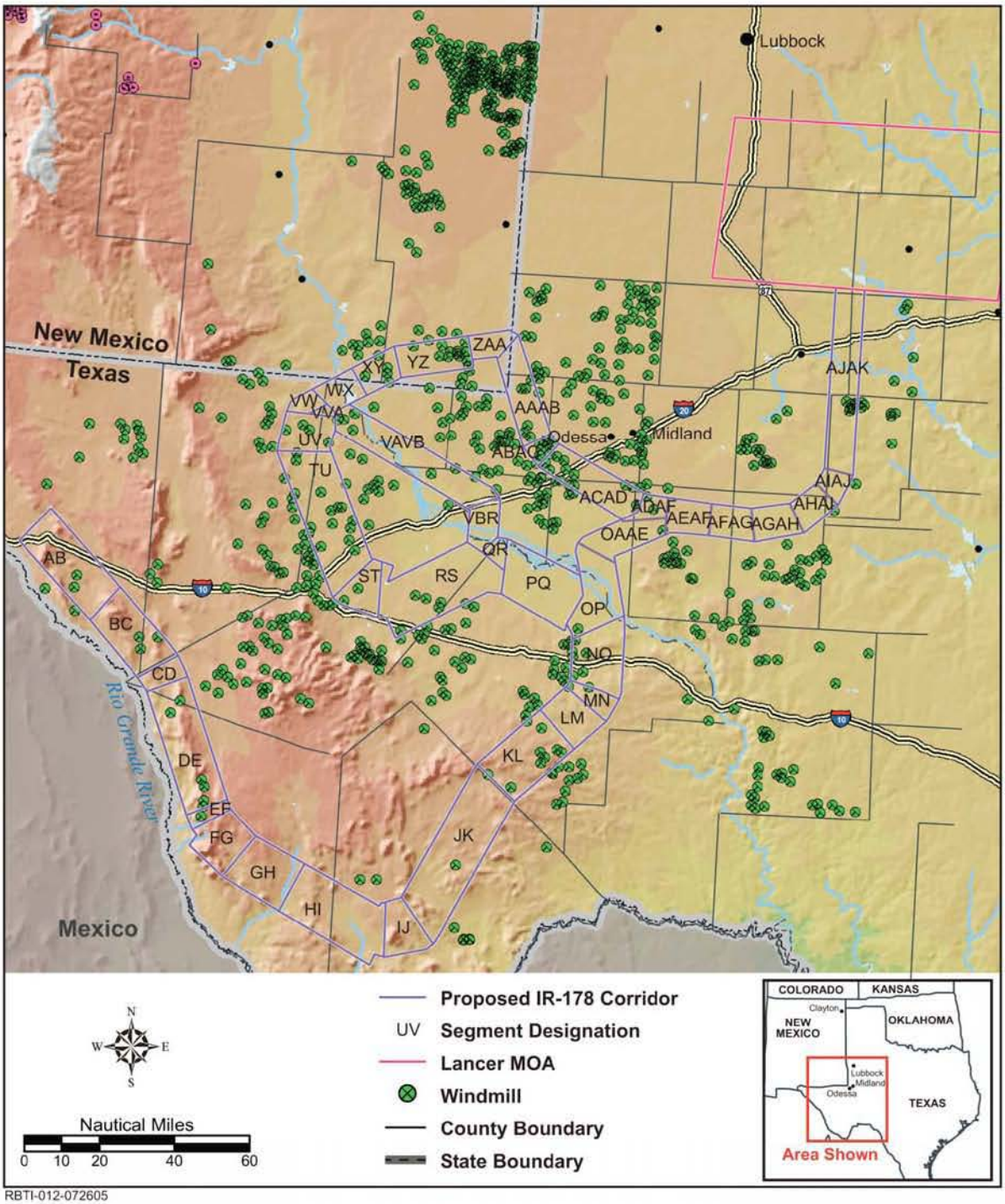

Figure S2-15
Alternative B
Locations of Windmills Under IR-178 Airspace

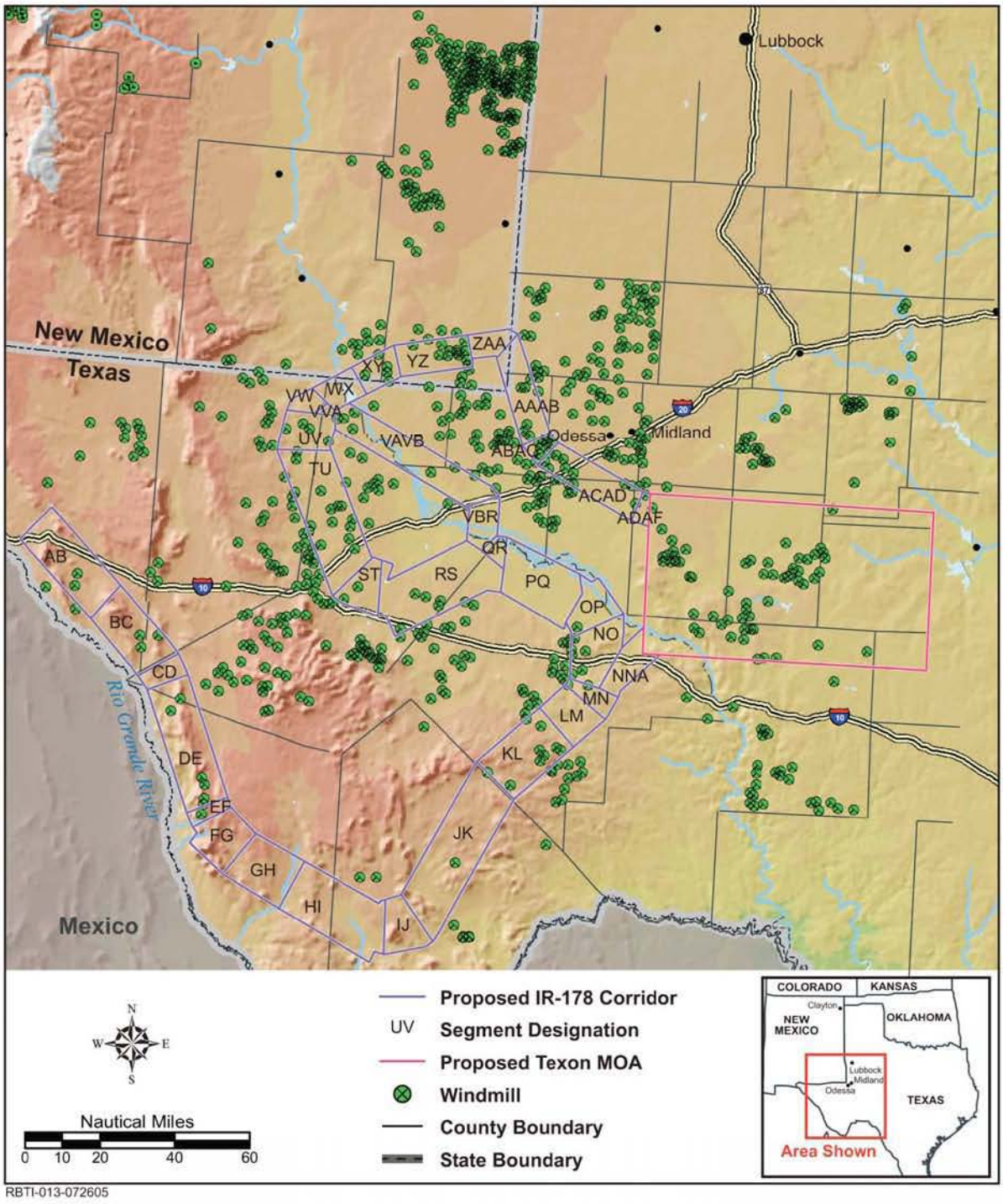

Figure S2-16
Alternative C
Locations of Windmills Under IR-178 Airspace

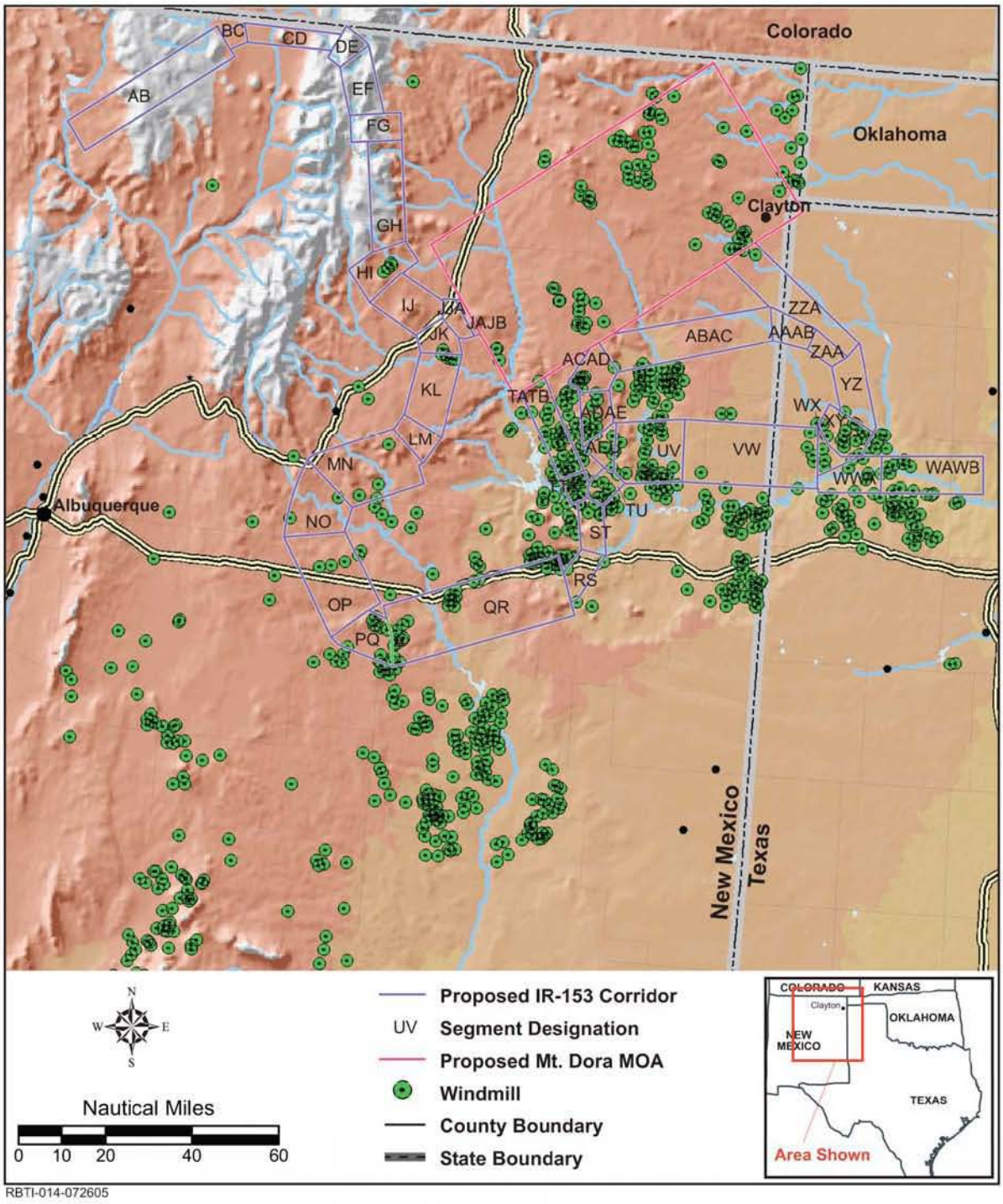

Figure S2-17
Alternative D
Locations of Windmills Under IR-153 Airspace

To assess the potential for impacts, the Air Force estimated the probability of overflight of these windmills. This estimate was derived using the following assumptions:

- B-1B flights tend to be dispersed throughout the MTR corridor width (Air Force 2000a).
- The effective "wing span" of the B-1B, for the purposes of this probability estimate, is 100 feet.
- The "sensitivity zone" of a windmill is within a radius of 100 feet.
- No required FAA avoidance procedures were considered.

Using these assumptions as well as the data on MTR segment widths, the analysis estimated the probability of an overflight of a windmill by a B-1B during a sortie-operation. The results demonstrate the probability of an overflight of a windmill would be extremely low, on the order of 1 in 70,000. For Alternatives B and C, segments XY and YZ, have a slightly higher concentration of windmills over a portion of the MTR, and as such, the probability of an overflight is likely to increase somewhat. In contrast, windmills in other segments are dispersed along the margins of, or parallel to the flight path, thereby minimizing the potential for overflights.

One-third of the segments in Alternative D lack windmills. The remaining 19 segments have varying concentrations of these structures along the respective segment. While detailed analysis for overflight probabilities was not performed on this MTR, it is evident that for some segments the values will be similar to those of Alternative B, while for some segments where the windmill concentration is higher, the probability may be slightly greater than 1 in 70,000.

Overall, the conservative analysis demonstrates that the probability of a vortex from a low-altitude B-1B overflight having an impact to ground structures, including windmills, would be extremely low. Given that only one to two pull-up maneuvers by B-1Bs could occur during each sortie-operation, the probability of occurrence of the stronger, higher velocity vortices impacting these structures from these events would be on the order of 1 in 100 million from the Air Force probability analysis (Skujins, personal communication 2005). FAA rules require all aircrews, including the Air Force, to avoid persons, vessels, vehicles, and structures by 500 feet. Consistent adherence to this rule would further diminish the potential for vortices to affect windmills.

Effects on Other Structures, Objects, Persons, Wildlife, and Livestock. For reasons similar to those described previously, vortices generated by B-1Bs and B-52s would not cause damage to or adversely impact other structures, objects, persons, wildlife, or livestock. First, most vortices would dissipate before reaching ground level. Second, vortex velocities would not exceed normal winds experienced in the affected areas. Third, even under the rare conditions that produce higher velocities, the potential for interaction between a vortex and a structure, object, person, wildlife, or livestock would be extremely unlikely due to required FAA avoidance procedures.

Summary of Effects. The analysis and data presented above demonstrate that wake vortices, under normal flight conditions, and all but rare atmospheric conditions, from B-52 and B-1B low-altitude flights fail to generate sufficient velocities to damage structures and vehicles, or pose a hazard to people or animals on the surface. The main conclusions derived from the analysis include:

- The maximum wind speed caused by vortices does not occur at ground level, but rather at a minimum height related to wing span (on the order of 1/3 of a wing span);
- Atmospheric conditions and winds, like those common to west Texas and northeastern New Mexico, may cause accelerated vortex decay and dissipation relative to that predicted by the model. Under rare conditions of calm winds and no atmospheric turbulence, vortices may persist longer and have greater velocities than predicted by the model;
- Model results indicate that vortices resulting from standard B-52 training operations would produce minimal velocities of no more than 3 mph at the surface and 27 mph at 66 feet AGL;
- Vortices produced from standard B-1B flights generate vortex velocities of 10 mph at the surface and 27 mph at 22 feet AGL;
- Planned pull-ups by B-1Bs, which may be executed once or twice per sortie-operation, can generate much higher vortex velocities (e.g., 92 mph) near the ground. These events, however, are infrequent and the chance of these higher energy vortices impacting a windmill structure is extremely remote and improbable;
- Commonly used wind scales demonstrate that the vortices would, except in the case of B-1B pull-ups and rare atmospheric conditions, produce velocities below those likely to affect structures and objects;
- Structures, objects, persons, wildlife, and livestock in the area underlying proposed IR-178 and IR-153 are consistently subject to average winds and winds gusts that match potential B-52 and B-1B vortex wind speeds;
- Factors limiting the potential effects of vortices include: only a proportion of MTR segments would permit flight down to 300 to 500 feet AGL where such effects could occur; many segments would support less than the maximum (i.e., 1,560) number of annual sortie-operations; and FAA rules require avoidance of structures; and
- The probability of overflight of a windmill along the MTRs for Alternatives B, C, and D would be extremely low.

In summary, the flight activities along proposed IR-178 (Alternatives B and C) or IR-153 (Alternative D) would not likely cause damage to ground structures. However, should such damage possibly occur, the Air Force operates a claims program to address and resolve the matter. If a claim arises against the Air Force it needs to be documented on a form describing the event and submitted to the nearest Air Force base.

CHAPTER 3

SUPPLEMENTAL DOCUMENTATION ON FAA COMMENTS

S3.0 SUPPLEMENTAL DOCUMENTATION ON FAA COMMENTS

In its decision, the Fifth Circuit Court of Appeals noted that Air Force regulations implementing NEPA require that an EIS include "responses to comments on the Draft EIS by modifying the text and referring in the appendix to where the comment is addressed or providing a written explanation in the comments section, or both" (32 CFR §989.19(d)). Treating the FAA's informal aeronautical input as "comments on the Draft EIS," the Court determined (see Appendix A) that the Air Force "responded to the FAA solely by modifying the text," but failed to "refer in the appendix to where the FAA's comments were addressed or provide any written explanation." The Court ruled that the Air Force's lack of documentation reflecting changes made to the Final EIS from the Draft EIS as a result of the response to the informal aeronautical study contrary to the provisions of 32 CFR §989.19(d) rendered "this portion of the … EIS inadequate."

The Final EIS (Air Force 2000a) analyzed and addressed potential airspace impacts, devoting dozens of pages of discussion in Chapter 4 to the topic. For each alternative, the Final EIS described the existing airspace situation, including military, civil, and commercial aviation. It then assessed the potential impacts to the structure and use of the airspace system for these entities based on implementation of each alternative. The Final EIS incorporated changes and additions in response to input provided by the FAA (see Appendix B), further refining the aeronautical impact analysis. This Supplemental EIS, in compliance with the Court's order, specifically identifies how and where the Air Force addressed the FAA's aeronautical comments in the Final EIS.

As described in Section 1 of this Supplemental EIS, the Air Force published the RBTI Draft EIS in March 1999, with the official public comment period extending through June 16, 1999. The FAA did not provide the Air Force with specific comments on the Draft EIS during the formal public comment period. Rather, the FAA, in its role as a cooperating agency, reviewed the Air Force's proposed action and alternatives and discussed issues with the Air Force on an ongoing basis. As a part of that ongoing process, the FAA, on August 6, 1999, provided the Air Force with an informal aeronautical study[1] consisting of documents prepared by the Fort Worth Air Route Traffic Control Center (ARTCC), the Albuquerque ARTCC, the Houston ARTCC, the Midland Air Traffic Control Tower (ATCT), and the Abilene ATCT (see Appendix B). The Air Force considered these FAA documents in preparing the Final EIS (Air Force 2000a).

[1] This study is referred to as "informal" because it preceded the Air Force's formal submittal of its RBTI airspace proposal to the FAA in April 2000. After receiving the Air Force's formal proposal, the FAA conducted a "formal" aeronautical study in accordance with FAA Order 7400.2 (see *Combined Aeronautical Study, Lancer Military Operations Area* in Appendix B).

Having acknowledged that the Air Force responded to the FAA's input by modifying the text of the RBTI Final EIS (Air Force 2000a), the Court ruled that the Air Force did not comply with the requirements of 32 CFR ∫989.19(d) to directly identify such changes. Therefore, this section provides supplemental pages that identify the comments in the FAA's informal aeronautical study, indicate how and where the Air Force modified the Final EIS to address the comments, and provide further explanation of the context for the modifications. Table S3-1, which presents the comments and responses in a format similar to that in Volume II of the RBTI Final EIS (Air Force 2000a), also provides supplemental pages that should be attached to page 687 of the Comments section and page 38 of the Responses section in that document. Table S3-1 includes the following categories:

- # – provides a number identifier for the specific FAA comment in the informal study.
- Alternative – identifies the alternative (B, C, or D) discussed by the FAA comment.
- Comment Page – denotes the page in the relevant FAA document on which the comment occurs.
- "Para" – denotes the numbered and/or lettered paragraph (if any) associated with the comment in the relevant FAA document.
- FAA Comment – provides a concise summary of each FAA comment.
- Location of Change in Final EIS – lists the portion and page number within the Final EIS modified to address the FAA comment.
- Change in Final EIS – explains how the Final EIS was modified in response to the FAA comment.
- Response – explains the rationale for the change and its relevance to evaluating potential impacts to civil and commercial aviation.

The FAA informal study yielded 29 total comments, 21 of which resulted in changes or clarifications to the Final EIS. The eight other comments did not warrant any changes since they were consistent with the analysis and conclusions already presented in the Draft EIS (Air Force 1999). In sum, the comment responses demonstrate that modifications made in the Final EIS (Air Force 2000a) responded directly and substantively to the issues identified by the FAA. Moreover, the responses continue to support that the implementation of the preferred alternative, Alternative B: IR-178/Lancer MOA, would not cause significant impacts on civil and commercial aviation. Conversely, the Final EIS recognized in Appendix K, based on the FAA comments, that Alternative C: IR-178/Texon MOA would "significantly impair" civil and commercial air traffic, and that Alternative D: IR-153/Mt. Dora MOA would adversely impact the National Airspace System.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies							
#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
1	C-Texon	Cover Memo	2	Texon MOA would be limited in access and would be very rigidly managed with little or no capability expanded or delayed operations.	Appendix K • K-1 • K-2	"Identification of a preferred alternative followed review of technical analysis, comments from the public and agencies, as well as input from the FAA, a cooperating agency on this EIS." "input from the FAA was the primary tool used to differentiate between these two alternatives *(B and C)*." "The FAA indicated that the modification and increased use of the Texon MOA/ATCAA within Alternative C could significantly impair IFR traffic, would require rigid management with little or no capability to support flight changes or delayed operations, necessitate rerouting of civil and commercial aircraft using affected jet routes and federal airways, and possibly require restructuring of the airspace. Given these constraints, the operational flexibility of the proposed Texon MOA/ATCAA would be limited."	The Air Force responded to the summary statement in the FAA's cover letter to its aeronautical study by making several changes in the Final EIS. Indeed, the Final EIS states the importance of the FAA comments and generally paraphrases them to ensure the FAA's intent was reflected.

All FAA comments are located in Appendix B
Cover Memo: single page memo from FAA transmitting five attachments comprising an informal aeronautical study
Fort Work ARTCC inputs on Alternative C: IR-178/Texon MOA
FW Alt C: five page aeronautical study by Fort Worth ARTCC on Alternative C
FW Alt B: eleven page aeronautical study by Fort Worth ARTCC on Alternative B
ABQ Input: single page memo from Albuquerque ARTCC

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies

#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
2	B-Lancer	Cover Memo	2	The Lancer MOA proposal (with suggested modifications) has flexibility and is better suited to accommodate the designated activities as well as growth in mission activities and requirements.	Appendix K • K-1 • K-2	"Identification of a preferred alternative followed review of technical analysis, comments from the public and agencies, as well as input from the FAA, a cooperating agency on this EIS." "input from the FAA was the primary tool used to differentiate between these two alternatives *(B and C)*." "In contrast, the Lancer MOA/ATCAA associated with Alternative B offers flexibility and is better suited to support the designated training activities with less potential interference to other aviation in the area." "These factors make Alternative B the more operationally preferable alternative, therefore, it has been identified as the Air Force's preferred alternative."	The Air Force responded to the summary statement in the FAA's cover letter to its aeronautical study by making several changes in the Final EIS. Indeed, the Final EIS states the importance of the FAA comments and generally paraphrases them to ensure the FAA's intent was reflected. The Air Force followed the FAA's suggestion to select Alternative B as the preferred alternative.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies

#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
3	C-Texon	FW ALT C 1-2	2(a)	Activity within and around the area of the proposed Texon MOA includes arrival and departure traffic to and from the Abilene (ABI), Midland (MAF), San Angelo (SJT), Houston (IAH), and Dallas/Fort Worth, (DFW) terminal areas. A vast majority of this traffic navigates through most of the Texon MOA airspace. During arrival and departure pushes at the IAH and DFW areas, a high concentration of traffic would be in and adjacent to the proposed MOA.	4-39	"This area, however, includes arrival and departure traffic associated with Abilene, Midland, San Angelo, Houston, and Dallas-Fort Worth airport terminal areas."	The Air Force modified the language from the Draft EIS to the Final EIS to present the FAA's comments specifically addressing the potential effects of the Texon MOA on civil and commercial aviation.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies							
#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
4	C-Texon	FW ALT C 2	3(b)	Because the proposed MOA overlies some approach control airspace, approaches and approach procedures at these facilities would be significantly affected. At MAF, the HI ILS RWY 10, HI VOR/DME or TACAN RWY 16R, and HI VOR/DME or TACAN RWY 34L would be unusable because the holding patterns would all lie within the proposed MOA. At SJT, the HI ILS and HITACAN RWY 3, ILS RWY 3, LOC BC RWY 21, NDB RWY 3, GPS RWY 3, and GPS RWY 21 would not be usable because the proposed MOA would penetrate either the holding pattern, its protected airspace, or the procedure itself.	4-39 Appendix K K-2 2-70	"This area, however, includes arrival and departure traffic associated with Abilene, Midland, San Angelo, Houston, and Dallas-Fort Worth airport terminal areas. Normal routes to and from the Houston airport terminal area would cross through the proposed MOA. Approaches and approach procedures at Midland *(MAF)* and San Angelo *(SJT)* could also be affected." "The FAA indicated that the modification and increased use of the Texon MOA/ATCAA within Alternative C could significantly impair IFR traffic…." "Establish floor of the MOA above Instrument Approach Procedures minimum altitudes for all airports under or adjacent to the proposed MOAs" to provide "safe separation between civilian and military flight activities."	The Air Force modified the language from the Draft EIS to the Final EIS (in both the body of the Final EIS and the appendices) to present the FAA's comments specifically addressing the potential effects of the Texon MOA. Just like the FAA comments, the Air Force Final EIS specifically identifies impacts to Midland and San Angelo Airport approaches. The Air Force incorporated this management action into the proposal for the Final EIS to address issues raised by the FAA.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies							
#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
5	C-Texon	FW ALT C 2-3	4	The proposed Texon MOA would directly affect one airport that lies within ZFW boundaries. Hughes is a private airport underlying the central portion of the northern half of the proposed MOA. Under this proposal, any VFR traffic into any of these fields would most likely be required to transition the lower altitudes of the MOA and various altitudes of IR-178.	4-40	"A total of seven airfields underlie the proposed MOA/ATCAA …Lowering the floor of the Texon MOA/ATCAA could require development of special operating or avoidance measures for military aircraft flying over the vicinity of these airfields."	This statement in the Final EIS demonstrates that the Air Force considered and addressed the issues raised by the FAA. By not selecting Alternative C in the ROD, the Air Force further supported the FAA comments regarding impacts to civil and commercial aviation.
6	C-Texon	FW ALT C 3	5(a)	These aircraft *(those flying VFR)* would, however, need to be made aware of MOA activity and be expected to maintain heightened awareness while transitioning to the active MOA.	4-40 2-71	"Local VFR traffic would, however, have to become aware of new airspace in the northeast and west portions of the proposed Texon MOA/ATCAA." "Establish a toll free number to Dyess AFB. Establish a Military Radar Unit (MRU) and real-time communications."[2]	The Air Force recognized the FAA's concern regarding potential conflicts between military and civil aviation in, under, and near the MOA. These management actions defined in the Final EIS aimed at increasing civil aviators' awareness of MOA activities and at avoiding potential conflicts.

[2] The FAA's Special Use Airspace & Air Traffic Controlled Assigned Airspace website at http://sua.faa.gov/atcaaSplash.jsp provides scheduled activity for MOAs/ATCAAs which may be used for planning purposes. Civil aircraft may also obtain real-time MOA/ATCAA status by contacting Fort Worth Air Route Traffic Control Center on the frequency for the Lancer MOA listed in the legend of the Dallas-Ft Worth Sectional Aeronautical Chart. Information about IR-178 activity is available through Flight Service by dialing 1-800-WX-BRIEF or contacting Fort Worth Automated Flight Service Station on the frequency listed in the Airport/Facility Directory. The availability of these sources eliminates the need for the proposed MRU as an additional information source for Lancer MOA activity.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies

#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
7	C-Texon	FW ALT C 3	6(a2)	All of the IAH terminal area traffic would normally transition this area, climbing or descending through most of the MOA altitudes. As many as two dozen of these aircraft would be impacted daily by this proposal, which would be considered a significant impact on this sector.	4-39	"Normal routes to and from the Houston airport terminal area would cross through the proposed MOA."	The Air Force modified the language from the Draft EIS to the Final EIS (in both the body of the Final EIS and the appendices) to present the FAA's comments specifically addressing the potential effects of the Texon MOA. Just like the FAA comments, the Air Force Final EIS highlighted the issue with Houston *(IAH)* sector.
					2-70	"Establish floor of the MOA above Instrument Approach Procedures minimum altitudes for all airports under or adjacent to the proposed MOAs" to provide "safe separation between civilian and military flight activities."	The Air Force incorporated this management action into the proposal for the Final EIS to address issues raised by the FAA.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies

#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
8	C-Texon	FW ALT C 4	6(b2)	The DFW traffic is typically north of the proposed MOA, although during times of heavy arrival pushes, a large portion of the traffic would be vectored through the proposed MOA airspace. All of the Houston terminal area traffic would normally transition this area, some climbing or descending through most of the MOA altitudes. A large percentage of this sector's traffic would be impacted daily by this proposal, which would be considered a significant impact on this sector.	4-39 Appendix K K-2 2-70	"This area, however, includes arrival and departure traffic associated with Abilene, Midland, San Angelo, Houston, and Dallas-Fort Worth airport terminal areas. Normal routes to and from the Houston airport terminal area would cross through the proposed MOA." "The FAA indicated that the modification and increased use of the Texon MOA/ATCAA within Alternative C could significantly impair IFR traffic…" "Establish floor of the MOA above Instrument Approach Procedures minimum altitudes for all airports under or adjacent to the proposed MOAs" to provide "safe separation between civilian and military flight activities."	The Air Force modified the language from the Draft EIS to the Final EIS (in both the body of the Final EIS and the appendices) to present the FAA's comments specifically addressing the potential effects of the Texon MOA. Just like the FAA comments, the Air Force Final EIS specifically identifies impacts to Midland and San Angelo Airport approaches. The Air Force incorporated this management action into the proposal for the Final EIS to address issues raised by the FAA.
9	C-Texon	FW ALT C 4	7(a) 7(b)	Aircraft wishing to use this airway (V68) when the Texon MOA is in use will need to be routed around the Texon MOA via radar vectors. MOA activity under this proposal would present a significant impact on these routes require (sic) substantial rerouting and possibly airspace restructuring.	4-39/40	"Proposed additions to the Texon MOA/ATCAA would also affect two jet routes and a federal airway. Use of the MOA/ATCAA would require substantial rerouting and possibly restructuring for these jet routes and airways."	This information added to the Final EIS clearly presents the FAA's concerns. Indeed, it is almost identical to the FAA's statement.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies

#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
10	C-Texon	FW ALT C 5	11	This proposal would have a significant impact on existing conditions and/or operations.	Appendix K K-2	"The FAA indicated that the modification and increased use of the Texon MOA/ATCAA within Alternative C could significantly impair IFR traffic, would require rigid management with little or no capability to support flight changes or delayed operations, necessitate rerouting of civil and commercial aircraft using affected jet routes and federal airways, and possibly require restructuring of the airspace. Given these constraints, the operational flexibility of the proposed Texon MOA/ATCAA would be limited."	The Air Force responded to the summary statement in the FAA's aeronautical study with this statement indicating the significance of the effects on civil and commercial aviation.
11	C-Texon	FW ALT C 5	12	It is recommended that this alternative not be considered for implementation.	2-1 Appendix K K-2	"The Air Force has identified Alternative B, IR-178/Lancer MOA, as both the preferred and environmentally preferred alternative." "These factors make Alternative B the more operationally preferable alternative, therefore, it has been identified as the Air Force's preferred alternative."	In the analysis and in identifying the preferred alternative, the Air Force concurred with the FAA. This comment was, therefore, addressed in the Final EIS.
12	B-Lancer	FW ALT B 1-2	2(a)	During arrival and departure pushes at the IAH and DFW areas, a high concentration of traffic is immediately adjacent to the proposed MOA.	No Change	No Change	Since the affected airspace noted by the FAA would lie outside the proposed MOA, no conflict would occur. The conclusion in the Final EIS reflects this fact.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies

#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
13	B-Lancer	FW ALT B 2	2(b)	A "shadow" of airspace relatively unusable for commercial aviation exists in the proposed Lancer MOA area due to the requirements to route nonparticipating traffic around the White Sands Missile Range.	No Change	No Change	This comment merely stated a condition that would not change or be altered by the proposed MOA. As such, the Air Force indicated (in the Final EIS) that no impacts to airspace management were anticipated.
14	B-Lancer	FW ALT B 2	3(a)	Normal arrival and departure routing for the DFW terminal area is adjacent and parallel to the southern boundary and to the north and northeast of the proposed Lancer MOA. Normal routes to and from the Houston terminal area are nearly parallel and adjacent to the eastern boundary of the proposed MOA.	No Change	No Change	Since the affected airspace noted by the FAA would lie outside the proposed MOA, no conflict would occur. The conclusion in the Final EIS reflects this fact.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies							
#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
15	B-Lancer	FW ALT B 2	3(b)	There are, however, public use airports with Instrument Approach Procedures (IAP) that would be affected by this proposal. Snyder/Winston Field has only one IAP available to this airport, the NDB or GPS RWY 35, which would be unusable during times of MOA activity. Lamesa Municipal (2F5) has two approaches, NDB or GPS RWY 16 and NDB or GPS RWY 34, which would be unusable during normal MOA activity. The missed approach procedure to the NDB (non-directional beacon) or GPS RWY 17 approach to Avenger Field at Sweetwater could be impacted by the MOA.	2-70 2-71	"Establish floor of the MOA above Instrument Approach Procedures minimum altitudes for all airports under or adjacent to the proposed MOAs" to provide "safe separation between civilian and military flight activities." "Establish a Military Radar Unit (MRU) and real-time communications," to "allow easier local airport access."[2]	The Air Force incorporated this management action into the proposal for the Final EIS to address issues raised by the FAA. The Air Force incorporated this management action into the proposal for the Final EIS to address the FAA issue of ensuring continued IAP access to the underlying airports.
16	B-Lancer	FW ALT B 3	4	The proposed Lancer MOA would directly affect the following airports.	4-30/31	"Six airfields, with annual use ranging from less than 50 to 2,500 operations, underlie the current MOAs and would underlie the proposed Lancer MOA/ATCAA."	The FAA notes potential effects on seven airfields, but one (Big Spring) lies south of the proposed MOA. As such, the Final EIS is accurate since it addresses the potential impacts to those airfields under the MOA.

[2] The FAA's Special Use Airspace & Air Traffic Controlled Assigned Airspace website at http://sua.faa.gov/atcaaSplash.jsp provides scheduled activity for MOAs/ATCAAs which may be used for planning purposes. Civil aircraft may also obtain real-time MOA/ATCAA status by contacting Fort Worth Air Route Traffic Control Center on the frequency for the Lancer MOA listed in the legend of the Dallas-Ft Worth Sectional Aeronautical Chart. Information about IR-178 activity is available through Flight Service by dialing 1-800-WX-BRIEF or contacting Fort Worth Automated Flight Service Station on the frequency listed in the Airport/Facility Directory. The availability of these sources eliminates the need for the proposed MRU as an additional information source for Lancer MOA activity.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies							
#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
17	B-Lancer	FW ALT B 3	4	Under this proposal, any VFR traffic into any of these fields would most likely be required to transition the lower altitudes of the MOA and various altitudes of IR-178. Any IFR traffic would not be able to access most airports with instrument approach procedures (IAP's) during MOA activity, as the IAP's would be unusable.	2-70 2-71 2-72	"Establish floor of the MOA above Instrument Approach Procedures minimum altitudes for all airports under or adjacent to the proposed MOAs" to provide "safe separation between civilian and military flight activities." "Establish a Military Radar Unit (MRU) and real-time communications," to "allow easier local airport access," and to "avoid potential interaction between military and general aviation aircraft flying in local airspace."[2]	The Air Force incorporated these management actions into the proposal for the Final EIS to address the FAA issue of ensuring continued VFR and IAP access to the underlying airports.
18	B-Lancer	FW ALT B 3	4	Aircraft using 21XS to/from the east would not be able to make normal climbs and/or descents during times that IR-178 is active, and would require vectors to the north or south of the airport until clear of IR-178.	No Change	No Change	The Air Force concluded that since the existing airspace of IR-128/180 and VR-1116 already occupied the location proposed for IR-178, the situation with 21XS described by the FAA study already applied and the proposal would not change conditions. As such, no changes were made in the Final EIS.

[2] The FAA's Special Use Airspace & Air Traffic Controlled Assigned Airspace website at http://sua.faa.gov/atcaaSplash.jsp provides scheduled activity for MOAs/ATCAAs which may be used for planning purposes. Civil aircraft may also obtain real-time MOA/ATCAA status by contacting Fort Worth Air Route Traffic Control Center on the frequency for the Lancer MOA listed in the legend of the Dallas-Ft Worth Sectional Aeronautical Chart. Information about IR-178 activity is available through Flight Service by dialing 1-800-WX-BRIEF or contacting Fort Worth Automated Flight Service Station on the frequency listed in the Airport/Facility Directory. The availability of these sources eliminates the need for the proposed MRU as an additional information source for Lancer MOA activity.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies							
#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
19	B-Lancer	FW ALT B 3-4	5(a)	These aircraft *(those flying VFR)* would, however, need to be made aware of MOA activity and be expected to maintain heightened awareness while transitioning to the active MOA.	2-70 2-71	"Establish floor of the MOA above Instrument Approach Procedures minimum altitudes for all airports under or adjacent to the proposed MOAs" to provide "safe separation between civilian and military flight activities." "Establish a Military Radar Unit (MRU) and real-time communications," to "allow easier local airport access, raise awareness and avoid potential conflicts between military and general aviation aircraft flying in local airspace."[2]	The Air Force incorporated these management actions into the proposal for the Final EIS to address the FAA issue of ensuring continued VFR access to the underlying airports and local flying areas; and enhancing VFR traffic's awareness of MOA activity.
20	B-Lancer	FW ALT B 4	6(a2)	This includes traffic to/from the DFW terminal area. This traffic is generally south of the proposed Lancer MOA…Therefore, this proposal would have little impact upon most of the traffic in this sector.	No Change	No Change	The analysis and conclusions in the Final EIS are consistent with the FAA's conclusion.

[2] The FAA's Special Use Airspace & Air Traffic Controlled Assigned Airspace website at http://sua.faa.gov/atcaaSplash.jsp provides scheduled activity for MOAs/ATCAAs which may be used for planning purposes. Civil aircraft may also obtain real-time MOA/ATCAA status by contacting Fort Worth Air Route Traffic Control Center on the frequency for the Lancer MOA listed in the legend of the Dallas-Ft Worth Sectional Aeronautical Chart. Information about IR-178 activity is available through Flight Service by dialing 1-800-WX-BRIEF or contacting Fort Worth Automated Flight Service Station on the frequency listed in the Airport/Facility Directory. The availability of these sources eliminates the need for the proposed MRU as an additional information source for Lancer MOA activity.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies							
#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
21	B-Lancer	FW ALT B 4	6(a3)	Winston Field at Snyder, Texas is one of two airports that would be impacted by this proposal. Operations in and out of this airport are approximately six per week, and although MOA activities would render IFR activities impossible, the impact would be negligible, as these activities are most generally VFR. Fisher County, lying just inside the eastern boundary of the MOA and supporting VFR operations, would be impacted negligibly.	4-30/31 2-70 2-71	"Six airfields, with annual use ranging from less than 50 to 2,500 operations, underlie the current MOAs and would underlie the proposed Lancer MOA/ATCAA. Lowering the floor of the MOA to 3,000 feet AGL would not interfere with operations at these airfields…" "Establish floor of the MOA above Instrument Approach Procedures minimum altitudes for all airports under or adjacent to the proposed MOAs" to provide "safe separation between civilian and military flight activities." "Establish a Military Radar Unit (MRU) and real-time communications" to "allow easier local airport access."[2]	The Final EIS assessed the potential effects on these airfields and, like the FAA, determined they were negligible. Nevertheless, the Air Force incorporated these management actions into the proposal for the Final EIS to address the FAA issue of ensuring continued VFR access to the underlying airports and local flying areas.
22	B-Lancer	FW ALT B 5	6(b2)	IFR traffic inbound or outbound to/from Big Spring, or transitioning to/from Midland and San Angelo would be impacted. These activities would number approximately twelve per day. Therefore, this proposal would pose a minimal impact on the traffic in this sector.	No Change	No Change	The analysis and conclusions in the Final EIS are consistent with the FAA's conclusion.

[2] The FAA's Special Use Airspace & Air Traffic Controlled Assigned Airspace website at http://sua.faa.gov/atcaaSplash.jsp provides scheduled activity for MOAs/ATCAAs which may be used for planning purposes. Civil aircraft may also obtain real-time MOA/ATCAA status by contacting Fort Worth Air Route Traffic Control Center on the frequency for the Lancer MOA listed in the legend of the Dallas-Ft Worth Sectional Aeronautical Chart. Information about IR-178 activity is available through Flight Service by dialing 1-800-WX-BRIEF or contacting Fort Worth Automated Flight Service Station on the frequency listed in the Airport/Facility Directory. The availability of these sources eliminates the need for the proposed MRU as an additional information source for Lancer MOA activity.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies

#	Alternative	Comment Page	Para	Summary of FAA Comment	Location of Change in Final EIS	Change in Final EIS	Response
23	B-Lancer	FW ALT B 5	6(c2)	This traffic is generally west of the proposed Lancer MOA, and approximately five aircraft per day during proposed usage hours, traverse the area over which the Lancer MOA would lie. Therefore, this proposal would pose little significant impact upon most of the traffic in the sector.	No Change	No Change	The analysis and conclusions in the Final EIS are consistent with the FAA's conclusion. Since the traffic described in the FAA comment occurs outside the proposed MOA, no impact would be expected.
24	B-Lancer	FW ALT B 5	6(c3)	Post-Garza is a VFR only airport and would realize an insignificant impact. T-Bar is also VFR only and most of the activity at this field is crop dusters during the summer and fall months. Because it lies just inside the western MOA boundary, the impact would not be significant. Lying on the western boundary of the proposed MOA, it would be accessible under VFR conditions. During usage times of the MOA, however, and IAPs would not be usable and access to the airport under IFR conditions when the MOA is active. Because IFR operations at Lamesa number approximately five per month, the impact would be minimal.	No Change	No Change	The analysis and conclusions in the Final EIS are consistent with the FAA's conclusion. The Final EIS addresses the usage levels for these airfields and concurs with the FAA that impacts of RBTI would be insignificant and minimal.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies

#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
25	B-Lancer	FW ALT B 6	6(d2)	However, traffic transitioning between the LBB and ABI areas utilities V385, and the north/south traffic in the sector utilizes J17. Both these routes lie in the northeastern corner of the proposed MOA. There is no viable alternative to the usage of these routes and adjustments would need to be made to the proposed MOA boundaries.	4-31	"The FAA would control the airspace when the MOA/ATCAA is activated, ensuring that there are no conflicts with the use of jet routes and airways. Minor rerouting of flights along these routes and/or scheduling of specific portions of the MOA/ATCAA could alleviate potential conflicts."	This assessment was added into the Final EIS to address the FAA concern, and the Air Force, at that time, determined that rerouting and/or scheduling would prevent the conflicts. Subsequent to the issuance of the Final EIS, the Air Force eliminated the northeastern corner of the proposed MOA/ATCAA and the FAA realigned V385 to minimize impacts on IFR aircraft.
26	B-Lancer	FW ALT B 6	6(e2)	The traffic is generally south of the proposed Lancer MOA. During proposed usage hours, there would be several periods of heavy commercial aviation traffic traversing the area adjacent to the proposed Lancer MOA. At times this traffic would need to be vectored through the MOA for sequencing and fix balancing into the DFW terminal area. Therefore, this proposal would pose a very slight impact upon a portion of the traffic in this sector.	No Change	No Change	The analysis and conclusions in the Final EIS are consistent with the FAA's conclusion. Most of the traffic lies outside the MOA and any potential conflicts would be minor.

Table S3-1 Responses to Comments in FAA Informal Aeronautical Studies							
#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
27	B-Lancer	FW ALT B 6	6(f2)	The traffic is generally north of the proposed Lancer MOA, with the exception of one departure transition which traverses the northern portion of the proposed MOA, and J17 which traverses the northeastern corner of the proposed MOA. During proposed usage hours, there would be several periods of heavy commercial aviation traffic traversing the northern portion to the proposed Lancer MOA above FL240. At other times, traffic would need to be vectored through the MOA for sequencing and fix balancing into the DFW terminal area. Therefore, this proposal would pose a very significant impact upon a portion of the traffic in this sector.	4-31	"The FAA would control the airspace when the MOA/ATCAA is activated, ensuring that there are no conflicts with the use of jet routes and airways. Minor rerouting of flights along these routes and/or scheduling of specific portions of the MOA/ATCAA could alleviate potential conflicts."	This assessment was added into the Final EIS to address the FAA concern, and the Air Force, at that time, determined that rerouting and/or scheduling would prevent the conflicts. Subsequent to the issuance of the Final EIS, the Air Force eliminated the northeastern corner of the proposed MOA/ATCAA and the FAA realigned V385 to minimize impacts on IFR aircraft.

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#	*Alternative*	*Comment Page*	*Para*	*Summary of FAA Comment*	*Location of Change in Final EIS*	*Change in Final EIS*	*Response*
28	B-Lancer	FW ALT B 7	(6g2)	This traffic is north and south of the proposed Lancer MOA, and also includes one route that transitions the MOA. A few times during the normal weekday departure pushes are heavy and MOA activity could have a very significant effect on this sector. During lighter departure pushes, it is conceivable that an alternate route could be used to circumnavigate the MOA.	4-31	"The FAA would control the airspace when the MOA/ATCAA is activated, ensuring that there are no conflicts with the use of jet routes and airways. Minor rerouting of flights along these routes and/or scheduling of specific portions of the MOA/ATCAA could alleviate potential conflicts."	This assessment was added into the Final EIS to address the FAA concern, and the Air Force, at that time, determined that rerouting and/or scheduling would prevent the conflicts. The FAA vectors or reroutes nonparticipating aircraft around the active MOA, or stratifies the MOA so nonparticipating aircraft can fly through the unused airspace. Subsequent to the issuance of the Final EIS, the FAA realigned V385.
29	D-Mt. Dora	ABQ Input 1	1	We opposed alternative D due to its adverse impact on the National Airspace System (NAS).	K-2	"This factor and the operational considerations described above resulted in eliminating Alternative D from being carried forward for the screening."	In the analysis and in identifying the preferred alternative, the Air Force concurred with the FAA that Alternative D was not operationally preferable.

As discussed above, the FAA's informal aeronautical study defined issues and concerns that the Air Force addressed in the RBTI Final EIS (Air Force 2000a) and ROD (Air Force 2000b). The Air Force addressed these issues and concerns by discussing and analyzing them in the Final EIS, and by adopting mitigation measures and management actions to reduce or eliminate their effects. Subsequently, the Air Force's ROD also committed to the management actions pertinent to the selected alternative, Alternative B: IR-178/Lancer MOA. These management actions included:

- Limiting the annual sortie-operations to 1,560 instead of the proposed 2,660;
- Raising the floor altitudes of all segments of IR-178 to a minimum of 300 feet AGL;
- Protecting local airport use and general aviation by establishing a Military Radar Unit and a toll free telephone number at Dyess AFB[2]; and
- Reducing the potential conflicts between general aviation and military flight activities by raising the floor of the re-entry route (segments VAVB and VBR) to 6,000 feet MSL.

In April 2000, after the Air Force issued its ROD, it formally submitted its airspace proposal for the Lancer MOA to the FAA (Appendix C). This proposal contained a slight modification to the shape of the Lancer MOA: the Air Force eliminated the northeastern corner of the MOA (Figure S3-1) to prevent conflicts with air traffic on a Jet Route, a Federal Airway, and the transition into Lubbock Airport (Appendix B). Because this change reduced potential air traffic conflicts and would not generate impacts, the original analysis in the RBTI Final EIS sufficed to comply with NEPA, and there was no need for additional impact analysis.

In August 2000, the FAA conducted a formal aeronautical study in accordance with FAA Order 7400.2 (see *Combined Aeronautical Study, Lancer Military Operations Area* in Appendix B). This study provided "a factual baseline from which to assess the Lancer MOA proposal." With agreement from the Air Force, the proposed floor of the Lancer MOA was amended from 3,000 feet AGL to 6,200 feet MSL to "facilitate transit of non-participating aircraft under the floor of the airspace" (Appendix B). This change reduced impacts to civil and commercial aviation and did not alter any other effects previously documented in the RBTI Final EIS (2000a). As such, it required no additional NEPA analysis. The FAA independently reviewed and adopted the RBTI Final EIS, and approved the Lancer MOA and associated modifications to IR-178. As part of its review, the FAA recognized the mitigation measures and management actions presented in the Air Force's ROD (Air Force 2000b).

[2] The FAA's Special Use Airspace & Air Traffic Controlled Assigned Airspace website at http://sua.faa.gov/atcaaSplash.jsp provides scheduled activity for MOAs/ATCAAs which may be used for planning purposes. Civil aircraft may also obtain real-time MOA/ATCAA status by contacting Fort Worth Air Route Traffic Control Center on the frequency for the Lancer MOA listed in the legend of the Dallas-Ft. Worth Sectional Aeronautical Chart. Information about IR-178 activity is available through Flight Service by dialing 1-800-WX-BRIEF or contacting Fort Worth Automated Flight Service Station on the frequency listed in the Airport/Facility Directory. The availability of these sources eliminates the need for the proposed MRU as an additional information source for Lancer MOA activity.

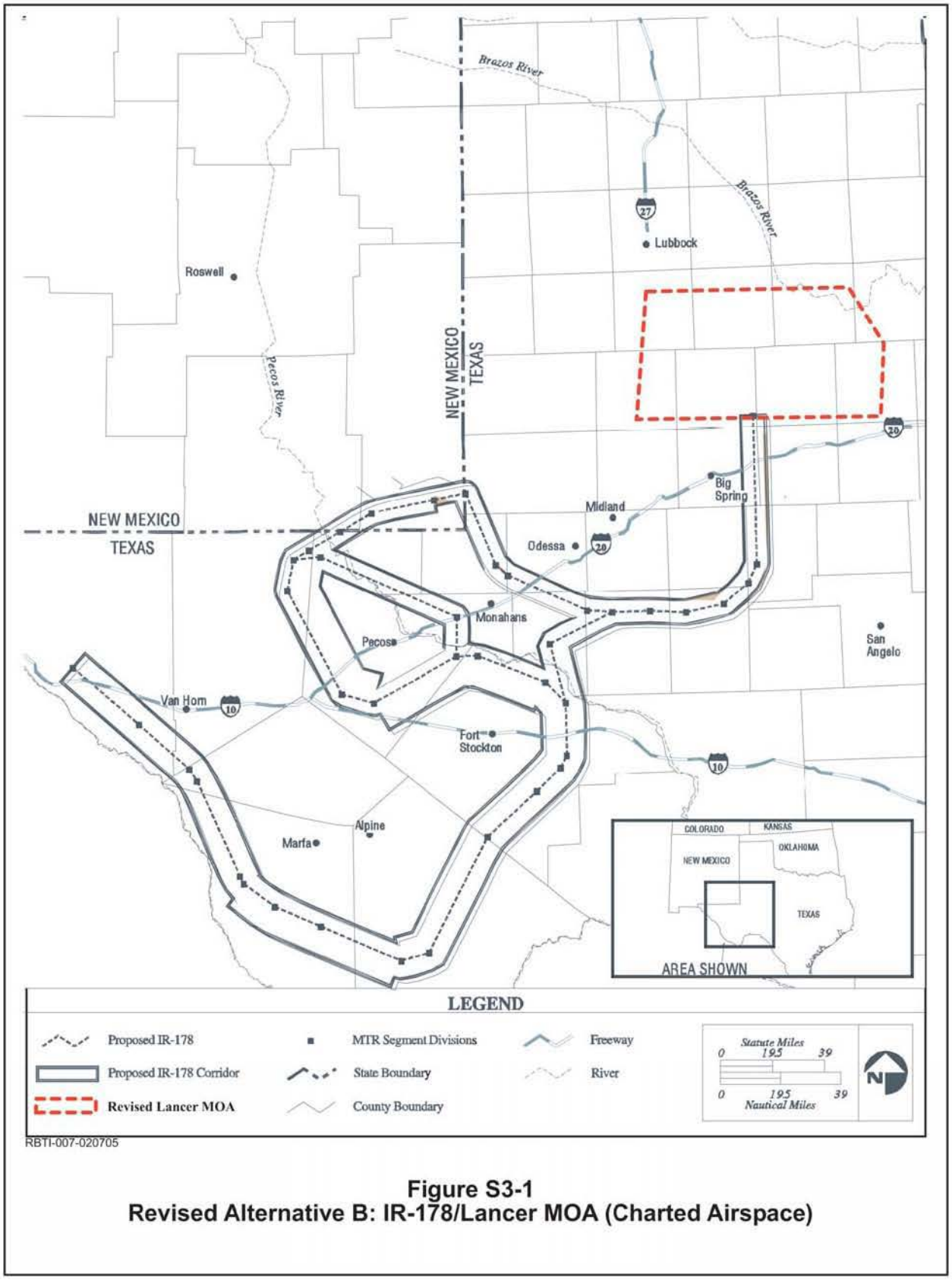

Figure S3-1
Revised Alternative B: IR-178/Lancer MOA (Charted Airspace)

CHAPTER 4

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S4.0 REFERENCES CITED

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CHAPTER 5

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S5.0 PREPARERS AND CONTRIBUTORS

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CHAPTER 6

LIST OF REPOSITORIES

S6.0 LIST OF REPOSITORIES

Title	Address	City	State	Zip
Abilene Public Library	202 Cedar St.	Abilene	TX	79601
Alpine Public Library	203 N. 7th St.	Alpine	TX	79830
Amarillo Public Library	P.O. Box 2171	Amarillo	TX	79189
Stonewall County Library	P.O. Box H	Aspermont	TX	79502
Reagan County	County Courthouse	Big Lake	TX	76932
Howard County	312 Scurry St.	Big Spring	TX	79720
Crane County Library	701 S. Alford St.	Crane	TX	79731
Dallam County Library	420 Denrock Ave.	Dalhart	TX	79022
Jeff Davis County Library	Court and Main Streets	Ft. Davis	TX	79734
Ft. Stockton Public Library	400 N. Water	Ft. Stockton	TX	79735
Kent County Library	P.O. Box 28	Jayton	TX	79528
Winkler County Library	307 South Poplar	Kermit	TX	79745
Dawson County Public Library	P.O. Box 1264	Lamesa	TX	79331
Lubbock Library	1306 9th St.	Lubbock	TX	79401
Marfa City Municipal Library	P.O. Drawer U	Marfa	TX	79845
Irion County Library	P.O. Box 766	Merzton	TX	76941
Ward County Library	409 S. Dwight St.	Monahans	TX	79756
Ector County Library	321 W. 5th St.	Odessa	TX	79761
Reeves County Library	505 S. Park St.	Pecos	TX	79772
Post Public Library	105 East Main Street	Post	TX	79356
City of Presidio Library	P.O. Box K	Presidio	TX	79845
Rankin Public Library	P.O. Box 6	Rankin	TX	79778
Rotan Public Library	404 E. Snyder Ave.	Rotan	TX	79546
Tom Green County System	113 W. Beauregard Ave.	San Angelo	TX	76903
Sierra Blanca Public Library	Sierra Blanca	Sierra Blanca	TX	79851
Scurry County Public	1916 23rd St.	Snyder	TX	79549
Sterling County Public	P.O. Box 1130	Sterling City	TX	76951
Taos Public Library	402 Camino de la Placita	Taos	NM	87571
City-County Library	Box 1018	Tahoka	TX	79373
Van Horn Library	P.O. Box 129	Van Horn	TX	79855

APPENDIX A

FIFTH CIRCUIT COURT OF APPEALS OPINION, OCTOBER 12, 2004

United States Court of Appeals
Fifth Circuit
FILED
October 12, 2004
Charles R. Fulbruge III
Clerk

IN THE UNITED STATES COURT OF APPEALS

FOR THE FIFTH CIRCUIT

No. 02-60288

DAVIS MOUNTAINS TRANS-PECOS HERITAGE ASSOCIATION, a Texas non-profit corporation,

Petitioner,

versus

FEDERAL AVIATION ADMINISTRATION; MARION C. BLAKEY, Administrator, FEDERAL AVIATION ADMINISTRATION; NORMAN Y. MINETA, SECRETARY, DEPARTMENT OF TRANSPORTATION,

Respondents.

No. 03-10506

DAVIS MOUNTAINS TRANS-PECOS HERITAGE ASSOCIATION; DALE TOONE; SUSAN TOONE; TIM LEARY; REXANN LEARY; EARL BAKER; SYLVIA BAKER; MARK DAUGHERTY; ANN DAUGHERTY; DICK R. HOLLAND; J. P. BRYAN; JACKSON BEN LOVE, JR.; KAARE J. REEME,

Plaintiffs-Appellants,

versus

UNITED STATES AIR FORCE; JAMES G. ROCHE; Secretary United States Air Force; UNITED STATES DEPARTMENT OF DEFENSE; DONALD H. RUMSFIELD, Secretary of Defense,

Defendants-Appellees.

No. 03-10528

BUSTER WELCH; JOHN F. OUDT; LESA OUDT; JOHN DIRK OUDT; CINDY ANN SPIRES; ET AL,

Plaintiffs-Appellants,

versus

UNITED STATES AIR FORCE; F. WHITTEN PETERS, Secretary of the United States Air Force; WENDELL L. GRIFFIN, Colonel, Commander, 7th Bomb Wing, Dyess Holloman Air Force Base; CURTIS M. BEDKE, Brigadier General, Commander, 2nd Bomb Wing, Barksdale Air Force Base; UNITED STATES DEPARTMENT OF DEFENSE; DONALD H. RUMSFIELD, SECRETARY DEPARTMENT OF DEFENSE,

Defendants-Appellees.

Petitions for Review of an Order of the
Federal Aviation Administration

Before REAVLEY, JONES and DENNIS, Circuit Judges.

REAVLEY, Circuit Judge:*

In these consolidated appeals, petitioners challenge various actions by the United States Air Force (Air Force) and the Federal Aviation Administration (FAA) in connection with the Realistic Bomber Training Initiative (RBTI).[1] Petitioners allege that the Air Force and FAA failed to follow procedures mandated by the National Environmental Policy Act, 42 U.S.C. §§ 4321-4370f (NEPA) and its implementing regulations, 40 C.F.R. §§ 1500.1-1508.28 (2003) (CEQ regulations), 32 C.F.R. §§ 989.1-989.38 (2004) (Air Force regulations), and ask this court to set aside those agency actions and remand to the agencies for NEPA-sufficient procedure.[2] We agree that the Environmental Impact Statement (EIS)

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*Pursuant to 5TH CIR. R. 47.5, the Court has determined that this opinion should not be published and is not precedent except under the limited circumstances set forth in 5TH CIR. R. 47.5.4.

[1] A list of acronyms used in this opinion is appended.

[2] This case comes to us as two appeals from two district court decisions (*Davis Mountains Trans-Pecos Heritage Association v. U.S. Air Force*, 249 F. Supp. 2d 763 (N.D. Tex. 2003) and *Welch v. U.S. Air Force*, 249 F. Supp. 2d 797 (N.D. Tex. 2003)), consolidated for briefing, and a direct appeal from two orders of the FAA brought by Davis Mountains Trans-Pecos Heritage Association in which the Welch parties have intervened.

prepared by the Air Force and adopted by the FAA does not satisfy NEPA and therefore remand to the agencies to prepare a supplemental EIS in accordance with this opinion.

I. Background

The basis of petitioners' complaints is the RBTI, a plan to provide airspace and ground-based assets for realistic and integrated B-52 and B-1 Bomber flight training within 600 miles of Barksdale and Dyess Air Force Bases. The RBTI includes a Military Operations Area (MOA), linked to a Military Training Route (MTR) by an Electronic Scoring Site system. The MOA provides space, identified to civil and commercial aircraft, where military aircraft can practice air-to-ground and air-to-air training. The MTR is a flight corridor where pilots can practice low-altitude navigation and maneuvers.

Concluding that implementation of the RBTI would constitute a "major action" under NEPA, the Air Force prepared an EIS.[3] The FAA participated in the NEPA process as a cooperating agency.[4] The EIS analyzed three alternative locations for the RBTI and a no action alternative. Two months after issuing the final EIS, the Air Force issued a Rule of Decision (ROD) adopting its preferred

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[3] 42 U.S.C. § 4332(C).

[4] 40 C.F.R. § 1501.6.

alternative (Alternative B). Alternative B, located mostly in western Texas, would modify and enlarge existing MTR Instrument Route 178 (IR-178) and create Lancer MOA by consolidating and expanding three existing MOAs. The FAA adopted the final EIS and approved Lancer MOA and the IR-178 modifications.

Petitioners are Davis Mountains Trans-Pecos Heritage Association (DMTPHA), a nonprofit corporation whose members are farmers, ranchers, and business people living and working in the areas underlying the RBTI airspace, and similarly situated named individuals. Concerned with potential impacts of the RBTI on underlying land, petitioners challenged the NEPA compliance of the Air Force and several named federal defendants in the district court. *Davis Mountains Trans-Pecos Heritage Association v. U.S. Air Force*, 249 F. Supp. 2d 763 (N.D. Tex. 2003); *Welch v. U.S. Air Force*, 249 F. Supp. 2d 797 (N.D. Tex. 2003) (hereinafter "Air Force cases"). Petitioners seek review of that court's summary judgments in favor of defendants as well as the FAA's approval of Lancer MOA and modified IR-178.

II. Jurisdiction

This court has jurisdiction to review the district court's grants of summary judgment in the Air Force cases under 28 U.S.C. § 1291. We have jurisdiction to review the FAA's approvals under 49 U.S.C. § 46110(a), providing for review of

FAA orders in the Courts of Appeals. We lack jurisdiction, however, to hear any claims of the Welch intervenors in the FAA appeal not raised by petitioners in that case. *United Gas Pipe Line Co. v. FERC*, 824 F.2d 417, 434-38 (5th Cir. 1987). In *United Gas*, we held that intervenors in a suit challenging FERC action under the Natural Gas Act could not raise issues in addition to those raised by petitioners, in order to prevent intervenors from effectively appealing outside the sixty day statutory period for appeal. *Id.* The same reasoning applies in the present case, where intervenors did not appeal the FAA decisions and filed their motion to intervene well outside the sixty day period for appeal provided for in § 46110(a). Therefore, we will not address intervenors' argument that the FAA failed to adequately consider the effects of the RBTI on Lubbock, Texas.

III. Standard of Review

We review the district court's grants of summary judgment in the Air Force cases *de novo*.[5] Our review of the FAA orders is also *de novo*, and we may "affirm, amend, modify, or set aside any part" of the orders approving Lancer MOA and modified IR-178.[6] As petitioners in both the Air Force cases and FAA appeal challenge those agencies' NEPA compliance, we must determine whether the

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[5] *Miss. River Basin Alliance v. Westphal*, 230 F.3d 170, 174 (5th Cir. 2000).

[6] 49 U.S.C. § 46110(c).

actions complained of were arbitrary or capricious under the Administrative Procedure Act.[7] Generally, agency action is arbitrary and capricious

> if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.[8]

Preparation of an EIS under NEPA furthers two broad goals. First, it ensures that the agency will consider relevant factors when making its decision. Second, its disclosure requirements foster meaningful public participation in the decisionmaking process.[9] NEPA does not, however, mandate a particular result.[10]

In determining the adequacy of an EIS, this court considers three factors:

> (1) whether the agency in good faith objectively has taken a hard look at the environmental consequences of a proposed action and alternatives;
> (2) whether the EIS provides detail sufficient to allow those who did not participate in its preparation to understand and consider the pertinent environmental influences involved; and
> (3) whether the EIS explanation of alternatives is sufficient to permit a reasoned choice among different courses of action.[11]

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[7] 5 U.S.C. § 706(2)(A); *Sierra Club v. Sigler*, 695 F.2d 957, 964 (5th Cir. 1983).

[8] *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

[9] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).

[10] *Westphal*, 230 F.3d at 175.

[11] *Id.* at 174.

The EIS must provide information satisfying these criteria, and its conclusions must be supported by evidence in the administrative record.[12]

IV. Environmental Effects of the RBTI

A. *Livestock*

Petitioners raise several challenges to the EIS's analysis of the RBTI's environmental effects. First, petitioners claim that the Air Force, and the FAA in adopting the EIS, did not adequately consider the effects of the proposal on the livestock on ranches underlying the RBTI route. Presumably relying on the principle that agencies must follow their own rules[13], petitioners argue that the Air Force failed to take the requisite "hard look"[14] at livestock impacts because it did not follow its 1993 handbook, "The Impact of Low Altitude Flights on Livestock and Poultry" (Handbook).[15] Petitioners argue that, because the Air

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[12] *Id.* at 174-75.

[13] *Lyng v. Payne*, 476 U.S. 926, 934 (1986).

[14] *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 374 (1989).

[15] In its "Findings" section, the Handbook states:

> Any establishment of new low altitude airspace will seek to minimize potential impacts on livestock and poultry. An initial consideration is the regional distribution of sensitive livestock and poultry operations in the geographical region being considered for low altitude flight. This regional distribution will be determined by identifying those counties that are among the leading counties for livestock and poultry commodities in their respective

Force did not undertake the county- and individual-level inquiry outlined in the Handbook, but instead relied on several studies of the effects of low-level overflights on livestock and a general overview of the underlying region, its analysis was inadequate under NEPA.

Petitioners rely on *Idaho Sporting Congress, Inc. v. Rittenhouse*, in which the Ninth Circuit invalidated a Forest Service EIS, because it analyzed impact on certain species on a "home range" scale, contrary to a Forest Service report stating, "the habitat needs of these species must be addressed at a landscape scale."[16] Contrary to *Rittenhouse*, however, cases have generally required that an agency pronouncement have the force and effect of law in order to bind the agency.[17] To have the force and effect of law, an agency pronouncement

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> state. ...
>
> In addition to consideration of counties, individual livestock and poultry operations within an area proposed for an MTR will also be considered.

[16] 305 F.3d 957, 973-74 (9th Cir. 2002); *see also Utahns for Better Transp. v. U.S. Dep't of Transp.*, 305 F.3d 1152, 1165 (10th Cir. 2002) (stating that "[a]gencies are under an obligation to follow their own regulations, procedures, and precedents, or provide a rational explanation for their departure" and invalidating EIS because agency did not follow its own regulation).

[17] *See, e.g., Lyng*, 476 U.S. at 937 (stating that "not all agency publications are of binding force"); *Schweiker v. Hansen*, 450 U.S. 785, 789-90 (1981) (holding that Social Security Administration Claims Manual was not binding agency rule); *Fano v. O'Neill*, 806 F.2d 1262, 1264 (5th Cir. 1987) (holding that INS Operations Instructions did not bind agency "because they are not an exercise of delegated legislative power and do not

normally "must have been promulgated pursuant to a specific statutory grant of authority and in conformance with the procedural requirements imposed by Congress."[18] Petitioners do not argue, nor does the record show, that the Air Force's Handbook was promulgated according to the APA's procedural requirements. *See* 5 U.S.C. § 553. Thus the Air Force retained discretion to analyze impacts on livestock by methods other than those contained in the Handbook, and we must address the adequacy of the Air Force's chosen method according to the arbitrary and capricious standard and the relevant criteria announced in *Westphal*.

Because determining whether the RBTI overflights will have a significant adverse effect on livestock requires resolution of issues of fact, we defer

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purport to be anything other than internal house-keeping measures."); *Western Radio Servs. Co. v. Espy*, 79 F.3d 896, 900-01 (9th Cir. 1996) ("[W]e will review an agency's alleged noncompliance with an agency pronouncement only if that pronouncement actually has the force and effect of law."); *Gatter v. Nimmo*, 672 F.2d 343, 347 (3d Cir. 1982) (holding that Veteran's Administration publications did not bind agency, because they were not promulgated using APA procedural requirements for rulemaking); *Fed. Land Bank in Receivership v. Fed. Intermediate Credit Bank*, 727 F. Supp. 1055, 1058 (D. Miss. 1989) (holding that agency directive not promulgated according to APA procedure did not have force and effect of law).

[18] *U.S. v. Fifty-Three Eclectus Parrots*, 685 F.2d 1131, 1136 (9th Cir. 1982); *see also Gatter,* 672 F.2d at 347; *McGrail & Rowley v. Babbit*, 986 F. Supp. 1386, 1393-94 (S.D. Fla. 1997); *Fed. Land Bank*, 727 F. Supp. at 1058.

substantially to the Air Force's expert analysis of the relevant data.[19] The EIS and administrative record reveal that the Air Force considered several studies and comments regarding potential impacts on livestock, including those indicating adverse effects. "[I]n making the factual inquiry whether an agency decision was 'arbitrary or capricious,' the reviewing court 'must consider whether the decision was based on a consideration of the relevant factors and whether there has been a clear error of judgment.'"[20] After reviewing the administrative record, we conclude that the Air Force's determination that no conclusive evidence showed adverse effects, based on its consideration of relevant studies, was not a clear error of judgment. In addition, the Air Force included a discussion of these studies in the main body of the EIS and its appendices, providing "detail sufficient to allow those who did not participate in its preparation to understand and consider the pertinent environmental influences involved."[21] We therefore find the EIS's analysis of livestock impacts adequate.

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[19] *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 377 (1989) (quoting *Kleppe v. Sierra Club*, 427 U.S. 390, 412 (1976)).

[20] *Marsh*, 490 U.S. at 378 (quoting *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402, 416 (1971)).

[21] *Westphal*, 230 F.3d at 174.

Because the Air Force's analysis complied with NEPA, the FAA's adoption of this portion of the EIS did not violate its obligations under that statute.[22]

B. *Economic Effects*

Petitioners' second challenge to the EIS's adequacy concerns its analysis of the RBTI's economic impacts. Specifically, petitioners fault the Air Force and FAA for failing to analyze in depth the effect that the RBTI will have on the values of underlying land for ranching, eco-tourism, and hunting lease income.[23] As studies regarding the effects of low level overflights on rural land values were unavailable, 40 C.F.R. § 1502.22 governed the Air Force's duty to obtain this information. That section provides: "[w]hen an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking." *Id.* It also mandates certain procedures, but only where adverse effects are "reasonably foreseeable." *Id.*

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[22] 40 C.F.R. § 1506.3(a) (stating that cooperating agency may adopt lead agency's EIS if it concludes that its NEPA requirements have been satisfied).

[23] *See* 42 U.S.C. § 4332(C)(ii) (stating that EIS must discuss environmental effects of proposed action); 40 C.F.R. § 1508.8 (defining "effects" to include economic impacts).

In response to facts similar to the present case, two courts have held that impacts of overflights on land values are not reasonably foreseeable and thus do not require detailed analysis.[24] We find the reasoning of these courts persuasive. As in *Lee v. U.S. Air Force*, the flights in the present case will take place along a corridor miles wide, and primarily over areas that have been overflown for years, and potential noise increases experienced by owners of land underlying the RBTI are not significant.[25] In addition, the Air Force examined available studies indicating that aircraft overflights near air bases and airports did not cause significant economic impacts. We find the Air Force's consideration of economic impacts adequate. Accordingly, neither the Air Force's nor the FAA's determination that economic impacts were unlikely was arbitrary or capricious.

C. *Wake Vortex Effects*

Petitioners also allege that the Air Force and FAA failed to take a "hard look" at the effects of wake vortices (trails of disturbed air) that would be

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[24] *Lee v. U.S. Air Force*, 354 F.3d 1229, 1241-42 (10th Cir. 2004) (holding Air Force's conclusion that decreased land values were not reasonably foreseeable and would be minimal based on prior airspace use and dispersion of flight paths reasonable); *Citizens Concerned About Jet Noise, Inc. v. Dalton*, 48 F. Supp. 2d 582, 598 (E.D. Va. 1999), *aff'd without opinion,* 217 F.3d 838 (4th Cir. 2000); *see also Norfolk v. U.S. EPA*, 761 F. Supp. 867, 887-88 (D. Mass. 1991) (upholding EIS that did not quantify property value decline due to proposed action where EIS stated that such decline was unquantifiable), *aff'd without opinion,* 960 F.2d 143 (1st Cir. 1992).

[25] *See* 354 F.3d at 1241-42.

generated by aircraft training in the RBTI. Petitioners argue that wake vortices damage ground structures like the windmills used by ranchers to provide water to livestock and wildlife. The Air Force responds that the EIS's discussion of wake vortex effects is adequate, because it "provides a narrative description of what causes vortices and points out that actual, not modeled, B-52 aircraft flying as low as 300 feet [above ground level] ... would generate a surface wind speed of less than 4 mph." Although CEQ regulations require agencies to "make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement,"[26] the EIS does not reveal the source of this data. Petitioners point out that the information came from an e-mail from the Boeing Company, stating that tests conducted between 1970 and 1986 "at flight level 300" resulted in "[n]o effect on the ground from the B-52 vortexes."

The Air Force presumably contends that "flight level 300" refers to 300 feet above ground level. In fact, it refers to 30,000 feet above ground level.[27] It is not clear whether the Boeing e-mail was a miscommunication, because the Air

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[26] 40 C.F.R. § 1502.24.

[27] Petitioners note that "flight level" is defined at 14 C.F.R. § 1.1 as "three digits that represents hundreds of feet. For example, flight level 250 represents a barometric altimeter indication of 25,000 feet ..." This court also found the term's definition through a simple internet search. *See* http://encyclopedia.thefreedictionary.com/Flight%20level.

Force did not include the actual Boeing study in the administrative record. Therefore, the e-mail alone cannot provide an adequate basis for the Air Force's conclusion that flights at 300 feet above ground level would generate low surface winds. To uphold that conclusion, we must find a more satisfactory basis than the Boeing e-mail.

The Air Force also relied on a graph providing a "rough estimate" of B1-B wake vortex effects at low altitudes. The administrative record shows that the equation used to generate the chart came from a 1949 aerodynamics text by James Dwinnell, but the Air Force did not include the equation or its inputs in the EIS or administrative record.[28] Petitioners urge this court to consider two extra-record documents - excerpts from the Dwinnell text and its expert's declaration - to determine whether the Air Force's chart was reliable and thus constituted a hard look at wake vortex effects.

Generally, the "record rule" limits judicial review of agency action to the administrative record before the agency at the time of its decision.[29] This court

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[28] 40 C.F.R. § 1502.24 states: "Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements. They shall identify any methodologies used ... for conclusions in the statement."

[29] *Fla. Power & Light v. Lorion*, 470 U.S. 729, 743-44 (1985).

has recognized an exception to the general rule, however, where examination of extra-record materials is necessary to determine whether an agency has adequately considered environmental impacts under NEPA.[30] In the present case we find it necessary to look at the Dwinnell text to determine whether the Air Force's use of the equation therein was sound. Because we lack technical expertise in aerodynamics, we also consider extra-record materials to aid our understanding of the science involved.[31]

Our review of the Dwinnell text and the declarations of petitioners' and the Air Force's experts reveal that the Air Force failed to take a hard look at the possible effects of wake turbulence on ground structures. Although an illustration in the EIS shows that the wake turbulence of an airplane at 300 feet above ground would generate wind speed around two mph at thirty-five feet (the height of a windmill as depicted on the illustration), the Air Force's own expert, Dr. Ojars Skujins, admits that a B1-B at this altitude could generate wind speeds

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[30] *Sierra Club v. Peterson*, 185 F.3d 349, 369-70 (5th Cir. 1999), *vacated on other grounds on reh'g,* 228 F.3d 559 (5th Cir. 2000); *Sabine River Auth. v. Dep't of Interior*, 951 F.2d 669, 678 (5th Cir. 1992); *accord Nat'l Audubon Soc'y v. Hoffman*, 132 F.3d 7, 14-15 (2d Cir. 1997).

[31] *Friends of Payette v. Horseshoe Bend Hydroelectric Co.*, 988 F.2d 989, 997 (9th Cir. 1993) (stating that courts may consider extra-record evidence when "necessary to explain technical terms or complex subject matter.").

as high as forty-seven mph just twenty-two feet above ground. Dr. Skujins also declares that the chart generated by the Air Force based on the Dwinnell equation is "oversimplified" and "does tend to underestimate the maximum vortex strength." Dr. Skujins concludes, however, that the Air Force was correct in finding that vortices would not create a significant impact, because average wind speeds in the RBTI area are similar to wind speeds generated by wake vortices.

The Air Force is entitled to rely on its own qualified experts' reasonable opinions in determining the significance of impacts.[32] The Air Force did not rely on Dr. Skujins's opinion, however, in addressing the wake vortex issue in the EIS process, but rather relied on the Boeing e-mail and the chart generated from the Dwinnell equation. As discussed above, neither document presents a reliable picture of the impact of wake vortices on surface structures, misinforming both public participation and the Air Force's conclusion.[33] The Air Force's reliance

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[32] *Sabine River Auth.*, 951 F.2d at 678.

[33] *See Methow Valley*, 490 U.S. at 349. Although the Air Force now argues that wake vortex effects would be speculative and thus need not be discussed in the EIS, during the NEPA process they took the position that wake vortex effects would not be significant based on the two pieces of evidence discussed. Courts may only uphold agency action on the bases articulated by the agency at the time of the action, and may not consider appellate counsel's "post hoc rationalizations." *Motor Vehicle Mfrs. Ass'n*, 463 U.S. at 49-50.

on this data cannot satisfy the hard look requirement of NEPA and thus this portion of the EIS is inadequate.[34] This determination applies equally to the FAA, which, as an adopting agency, was required to satisfy itself that the wake vortex discussion in the EIS complied with NEPA.[35]

D. *Effects on Civil and Commercial Aviation*

Petitioners' final challenge to the EIS's analysis of environmental effects concerns potential conflicts between training flights in IR-178 and Lancer MOA and civil and commercial aviation in western Texas. Petitioners contend that the Air Force's conclusion in the EIS that the RBTI would have little effect on airspace management is contradicted by an FAA study in the administrative record. In addition, petitioners claim that the Air Force violated its own regulations by failing to adequately address mitigation measures proposed by the FAA study in the EIS.

The Air Force argues that effects on aviation are "aeronautical" rather than "environmental," and thus do not require discussion in an EIS. Counsel for the Air Force acknowledged in oral argument, however, the difficulty involved in

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[34] *See Westphal*, 230 F.3d at 174-75 (stating that "the conclusions upon which an [EIS] is based must be supported by evidence in the administrative record.")

[35] 40 C.F.R. § 1506.3(a); Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, question 30, 46 Fed. Reg. 18026 (Mar. 23, 1981).

drawing a bright line between effects that are purely "aeronautical" and those that are "environmental." Because "'[e]nvironment' means something more than rocks, trees, and streams, or the amount of air pollution [- i]t encompasses all the factors that affect the quality of life,"[36] we are reluctant to draw such a line. Civil and commercial aviation are part of the modern human environment broadly defined, and because the RBTI would impact aviation, NEPA required the Air Force to address that impact in the EIS.[37]

"It is a familiar rule of administrative law that an agency must abide by its own regulations."[38] The Air Force regulations implementing NEPA provide that an EIS must include "responses to comments on the Draft EIS by modifying the text and referring in the appendix to where the comment is addressed or providing a written explanation in the comments section, or both."[39] In the present case the Air Force responded to the FAA solely by modifying the text. It did not refer in the appendix to where the FAA's comments were addressed or provide any written explanation, neglecting much of its responsibilities under the

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[36] *Jones v. U.S. Dep't of Hous. and Urban Dev.*, 390 F. Supp. 579, 591 (E.D. La. 1974).

[37] 42 U.S.C. § 4332(C)(i).

[38] *Fort Stewart Sch. v. Fed. Labor Relations Auth.*, 495 U.S. 641, 654 (1990).

[39] 32 C.F.R. § 989.19(d).

regulation. We therefore conclude that this portion of the EIS is also inadequate.

V. Mitigation

A. *Omission of Mitigation Discussion in Draft EIS*

In addition to their complaints regarding the EIS's environmental inadequacies, petitioners take issue with several aspects of the EIS's discussion of mitigation measures. First, they argue that the Air Force and FAA violated NEPA by failing to discuss mitigation measures in the draft EIS. CEQ regulations require agencies to prepare a draft EIS prior to issuance of a final EIS.[40] The draft "must fulfill and satisfy to the fullest extent possible the requirements established for final statements."[41] A final EIS must contain a discussion of possible mitigation measures.[42] Whether the draft EIS must also contain a discussion of mitigation measures is a question of first impression in this circuit.[43]

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[40] 40 C.F.R. § 1502.9(a).

[41] *Id.*

[42] *Methow Valley*, 490 U.S. at 351-52.

[43] As yet, the issue appears to have been directly addressed by only the Eastern District of California, in *Westlands Water District v. U.S. Dep't of the Interior*, 275 F. Supp 2d 1157, 1187-89 (E.D. Cal. 2002). In that case, the Department of the Interior

The Supreme Court has stated that, absent a discussion of possible mitigation measures, "neither the agency nor other interested individuals can properly evaluate the severity of the adverse effects."[44] Although the Court there referred to inclusion of a mitigation discussion in a final EIS, the same reasoning can apply to the draft. Under the structure created by the CEQ regulations, the lead agency must request comments from other agencies and the public on the draft EIS before preparing the final EIS.[45] Following that structure in the present case, the Air Force provided a public comment period on the draft which closed before the Air Force issued the final EIS. Thus, by excluding mitigation measures from the draft, the Air Force prevented the public from commenting on those measures during the comment period.

On the other hand, even if the agency omits the mitigation discussion from the draft, nothing prevents the public from commenting on the mitigation measures once the agency issues the final EIS, and petitioners do not argue that

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prepared a draft EIS without a discussion of mitigation measures that were later included in the final EIS. The court found the EIS inadequate under NEPA. The Ninth Circuit later reversed the district court, finding that the Department's draft EIS did contain a discussion of mitigation measures. 376 F.3d 853, 872-75 (9th Cir. 2004). Thus, the court of appeals did not address the question of whether the final EIS would have been adequate had the draft not contained such a discussion.

[44] *Methow Valley,* 490 U.S. at 352.

[45] 40 C.F.R. § 1503.1.

they were prevented from commenting during the two months between the issuance of the final EIS and the Air Force's ROD.[46] Given these considerations, we find it unnecessary in the present case to adopt a rigid rule that a draft EIS *must* contain a mitigation discussion, although we note that inclusion of such a discussion is ideal.

B. *Adequacy of Mitigation Discussion in Final EIS*

Petitioners also attack the discussion of mitigation measures in the final EIS and those adopted by the Air Force in its ROD.[47] First, petitioners argue that the final EIS does not adequately discuss measures to mitigate potential adverse effects on underlying livestock operations. Contrary to petitioners' assertions, however, the final EIS does recognize that overflights may injure livestock and provides mitigation in the form of a claims process for ranchers whose livestock suffer injury. In light of the Air Force's non-arbitrary

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[46] *See* 40 C.F.R. § 1503.1(b) ("An agency may request comments on a final environmental impact statement before the decision is finally made. In any case other agencies or persons may make comments before the final decision"). The public can access the final EIS under the Freedom of Information Act. 42 U.S.C. § 4332(C). The agency may not issue its decision until thirty days after publication of notice of the final EIS in the Federal Register. 40 C.F.R. §1506.10(b)(2). Thus, the public can obtain and comment on the final EIS during that period.

[47] CEQ regulations require a discussion of possible mitigation measures in an EIS. 40 C.F.R. §§ 1502.14(f), 1502.16(h).

conclusion that adverse effects on livestock were unlikely, we find the Air Force's limited discussion of measures to mitigate those effects reasonable.[48]

Petitioners also argue that reducing the annual number of sorties from the proposed 2,600 to 1,560 and utilizing existing military airspace to the maximum extent possible in creating Lancer MOA did not provide any mitigation because the RBTI would still impose more overflights on certain areas than they had experienced before implementation of the RBTI. This argument is premised on a misunderstanding of the term "mitigation." The CEQ regulations define "mitigation" as "[a]voiding the impact altogether by not taking a certain action or parts of an action" or "[m]inimizing impacts by limiting the degree or magnitude of the action and its implementation."[49] By reducing the number of sorties proposed for Alternative B by over 1,000 and avoiding creation of new airspace, the Air Force limited the magnitude of the RBTI. Thus, petitioners' argument that these measures did not truly "mitigate" is without merit, and the EIS is not invalid for failure to adequately address mitigation measures.

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[48] *See Izaak Walton League of Am. v. Marsh*, 655 F.2d 346, 377 (D.C. Cir. 1981) ("NEPA does not require federal agencies to examine every possible environmental consequence. Detailed analysis is required only where impacts are likely.")

[49] 40 C.F.R. § 1508.20.

VI. Extra-Record Materials

In addition to the evidence pertaining to wake vortex effects, petitioners sought in the Air Force cases to introduce extra-record evidence regarding livestock, socioeconomic, and noise effects. The district court excluded all extra-record submissions. Petitioners argue that, by not considering the extra-record evidence, the district court could not adequately review the Air Force's NEPA compliance.

Because district courts have discretion to consider extra-record evidence, we review the district court's decision not to consider such evidence for abuse of discretion.[50] "A district court abuses its discretion if it: (1) relies on clearly erroneous factual findings; (2) relies on erroneous conclusions of law; or (3) misapplies the law to the facts."[51] In the present case, the district court correctly stated the law regarding extra-record evidence in NEPA cases.[52] Without

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[50] *Northcoast Envtl. Ctr. v. Glickman,* 136 F.3d 660, 665 (9th Cir. 1998); *Hoffman*, 132 F.3d at 16; *see Davidson Country Oil Supply Co. Inc. v. Klockner, Inc.*, 908 F.2d 1238, 1245 (5th Cir. 1990) (stating that "[t]he trial court's discretion to admit or exclude evidence is generally broad").

[51] *McClure v. Ashcroft*, 335 F.3d 404, 408 (5th Cir. 2003).

[52] *Davis Mountains*, 249 F. Supp. 2d at 775-76; *Welch*, 249 F. Supp. 2d at 809-10; *see supra* section IV.C.

discussing its rationale, however, it excluded all of petitioners' proffered extra-record evidence.

As discussed in section IV.C., consideration of the Dwinnell text and expert declarations is necessary to determine whether the Air Force took a hard look at wake vortex effects. Thus, by excluding that evidence, the district court "misapplie[d] the law to the facts." Because this court has reviewed the extra-record submissions in its *de novo* review, however, we need not remand to the district court, but instead dispose of this issue by remanding to the Air Force to prepare an adequate supplemental EIS.

The remaining items of evidence consist of declarations of DMTPHA members and experts on livestock, economic, and noise effects of the RBTI. We conclude that the district court did not abuse its discretion in excluding this evidence. The DMTPHA members' declarations are largely cumulative of evidence already in the administrative record. In addition, the Air Force was entitled to rely on the reasonable opinions of its own experts regarding livestock, economic, and noise effects.[53] None of petitioners' proffered evidence on these issues shows that those experts' opinions were unreasonable, but instead

[53] *Sabine River Auth.*, 951 F.2d at 678.

presents opposing expert opinions. Because the Air Force's reliance on its own experts does not render its decisions arbitrary and capricious, admission of petitioners' opposing expert opinions would not show that the Air Force failed to take a hard look at these effects. Thus, admission of petitioners' extra-record evidence on all issues other than wake vortex was unnecessary to determine whether the Air Force adequately considered environmental impacts of the RBTI[54], and the district court's exclusion of that evidence was not an abuse of discretion.

VII. NEPA Documentation for Existing IR-178

Petitioners also claim that the Air Force failed to prepare necessary supplemental EIS's for IR-178 due to changes in the route and underlying land since the route's creation in 1985. CEQ regulations require agencies to supplement an EIS if the agency makes substantial changes to the proposed action or significant new circumstances or information arise bearing on the proposed action or its impacts.[55] A claim asserting that NEPA documentation must be supplemented has three elements: (1) ongoing or remaining federal

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[54] *See Sierra Club v. Peterson*, 185 F.3d 349, 369-70 (5th Cir. 1999), *vacated on other grounds on reh'g,* 228 F.3d 559 (5th Cir. 2000); *Sabine River*, 951 F.2d at 678; *accord Nat'l Audubon Soc'y v. Hoffman*, 132 F.3d 7, 14-15 (2d Cir. 1997).

[55] 40 C.F.R. § 1502.9(c)(1).

action and (2) new circumstances or information relevant to the environmental impact of the proposed action that are (3) significant enough to warrant supplementation of existing NEPA documents.[56]

The district court held this claim time-barred, finding that the Air Force's alleged NEPA failures occurred more than six years before petitioners filed suit.[57] Although NEPA and the APA do not contain limitations periods, this court has held that claims under the APA are subject to the general six-year statute of limitations for claims against the government.[58] The limitations period begins to run when the right of action first accrues.[59] Because petitioners allege

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[56] *Marsh*, 490 U.S. at 374.

[57] *Davis Mountains*, 249 F. Supp. 2d at 794-96. A short history of IR-178 is necessary to understand petitioners' complaint. The Air Force completed an Environmental Assessment (EA) and established the route in 1985 as IR-165. When the Air Force combined IR-165 with IR-128/180 in 1991, it changed the route name to IR-178. In 1994 an alternate exit was added to the route, taken from IR-144. The Air Force has no NEPA documentation for IR-144. Petitioners contend that these changes, in addition to changes in underlying land use, necessitated preparation of some kind of NEPA documentation - either a supplemental EA or EIS.

[58] 28 U.S.C. § 2401(a) ("[E]very civil action commenced against the United States shall be barred unless the complaint is filed within six years after the right of action first accrues."); *Geyen v. Marsh*, 775 F.2d 1303, 1306-07 (5th Cir. 1985); *see also Jersey Heights Neighborhood Ass'n v. Glendening*, 174 F.3d 180, 186 (4th Cir. 1999).

[59] 28 U.S.C. § 2401(a); 5 U.S.C. § 704; *Glendening*, 174 F.3d at 186.

agency inaction or delay under 5 U.S.C. § 706(1), we must determine whether this cause of action accrued more than six years before petitioners brought suit.

Petitioners argue that the limitations period does not apply to its IR-178 claim, because the Air Force's actions regarding IR-178 are ongoing. At least one court has concluded that the six-year limitations period does not apply to claims of unlawful delay under § 706(1), reasoning that unlawful delay of a statutory duty is a continuing violation of the statute.[60] Applying this line of reasoning in the present case would effectively remove the limitations period from claims that an agency has unlawfully delayed supplementation of NEPA documents, because a necessary element of such a claim is ongoing agency action.

We find the better view to be that a claim for agency delay in supplementing NEPA documents accrues when circumstances requiring supplementation first arise. Such a view prevents plaintiffs from circumventing the limitations period by phrasing their complaints against agencies as continuous delay (from the moment they failed to do something required by NEPA) rather

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[60] *Am. Canoe Ass'n v. U.S. EPA*, 30 F. Supp. 2d 908, 925-26 (E.D. Va. 1998) (stating that applying limitations period to claim of unlawful delay would be "grossly inappropriate, in that it would mean that [the agency] could immunize its allegedly unreasonable delay from judicial review simply by extending that delay for six years.")

than a failure to act at a discrete point in time. Petitioners argue that certain modifications to IR-178 required supplemental NEPA documentation and that the Air Force did not prepare it. That cause of action accrued when the modifications were implemented without the required documentation. Because all modifications that may have warranted supplementation occurred more than six years before petitioners filed suit, petitioners' supplementation claim is barred.[61]

VIII. FAA's Procedure on Limited Remand

As published in the National Flight Data Digest, modified IR-178 included eleven segments with floor altitudes lower than those evaluated in the EIS. The FAA claimed this was an inadvertent error and this court granted a limited remand to correct it. Petitioners now argue that the FAA failed to follow its own regulations in making the correction.[62]

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[61] Petitioners also assert that the original EA for IR-165 was insufficient under NEPA. This claim concerns past, rather than continuing, agency action (the Air Force's adoption of the EA). Because this past action occurred in 1985, the claim is barred by 28 U.S.C. § 2401(a).

[62] Regardless of whether the FAA followed its own procedures on the limited remand, petitioners do not contest that the RBTI altitudes now conform to those evaluated in the EIS. Thus, their original argument that implementation of unevaluated adverse effects (lower altitudes) invalidates the EIS is now moot.

The FAA's Order on Special Military Operations, FAA Order 7610.4J, provides certain procedures for establishing or modifying a MTR. Order 7610.4J requires, *inter alia*, a certain form, coordination with the Regional Air Traffic Control Center and others, and consideration of minimization of disturbance to persons and property on the ground. The FAA did not follow these procedures on remand, and argues that Order 7610.4J does not apply to corrections like those at issue, which originate within the FAA. We find the FAA's argument persuasive. Order 7610.4J speaks of route revisions sought by "military unit[s]," not ministerial revisions to correct internal error. Moreover, the FAA sought the remand to correct the altitudes to conform to those in the EIS, which had already considered minimization of ground disturbance. Because the result would be the same—modification of the altitudes to conform to the EIS–whether the FAA followed the procedure of Order 7610.4J or not, petitioners have not been prejudiced by the FAA's chosen procedure on remand, and we see no reason to invalidate the correction.[63]

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[63] *Pacific Molasses Co. v. FTC*, 356 F.2d 386, 390 (5th Cir. 1966). Petitioners also argue that the FAA exceeded the scope of the limited remand by issuing an Addendum to the Lancer MOA NRDD. Petitioners contend that the FAA issued this document to shore up its assertion that the NRDD served as the ROD for both the Lancer MOA and modified IR-178 (see discussion below). As discussed in the next section, we find the NRDD as it existed before the FAA added the Addendum adequate as a ROD for the entire RBTI. Thus the FAA did not exceed the scope of the limited remand by issuing

IX. ROD for IR-178 Modifications

Lastly, petitioners argue that the FAA failed to issue a ROD for the IR-178 modifications.[64] The FAA responds that, because IR-178 and Lancer MOA are "environmentally and aeronautically linked," its Non-Rulemaking Decision Document (NRDD) of December 11, 2001 for Lancer MOA serves as the ROD for both Lancer MOA and modified IR-178. Because we find the EIS inadequate and therefore must set aside both the Air Force's and FAA's RODs approving the RBTI, we need not address this issue.

X. Conclusion

For the foregoing reasons we vacate the decisions of the district court, the Air Force ROD and the FAA orders approving the RBTI. We remand to the Air Force and FAA to prepare a supplemental EIS which adequately addresses wake

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the Addendum, which states: "[b]eyond describing these inadvertent altitude discrepancies and documenting their correction, this addendum does not otherwise reopen the [] NRDD."

[64] Petitioners' additional argument that the FAA failed to evaluate environmental factors within the NEPA process is without merit. Petitioners argue that the FAA violated NEPA by conducting studies after the Air Force published the final EIS. NEPA, however, allows a cooperating agency to adopt a lead agency's EIS after its own review. 40 C.F.R. § 1506.3. Thus, in order for a cooperating agency to adopt the lead agency's EIS, the NEPA process actually requires the cooperating agency to do some independent study *after* the final EIS has been prepared. Petitioners do not offer any support for the notion that the "NEPA process" concludes once the lead agency issues the final EIS.

vortex impacts and FAA comments as required by CEQ and Air Force regulations.

Appendix

1. APA - Administrative Procedure Act
2. CEQ - Council on Environmental Quality
3. DMTPHA - Davis Mountains Trans-Pecos Heritage Association
4. EIS - Environmental Impact Statement
5. FAA - Federal Aviation Administration
6. IR - Instrument Route
7. MOA - Military Operations Area
8. MTR - Military Training Route
9. NEPA - National Environmental Policy Act
10. NRDD - Non-Rulemaking Decision Document
11. RBTI - Realistic Bomber Training Initiative
11. ROD - Record of Decision

APPENDIX B

FAA DOCUMENTS

LIST OF FAA DOCUMENTS IN APPENDIX B

Memorandum dated August 6, 1999, regarding FAA informal aeronautical study on RBTI proposal, with attached documents prepared by:

- Fort Worth Air Route Traffic Control Center (Attachment 1)
- Albuquerque Air Route Traffic Control Center (Attachment 2)
- Houston Air Route Traffic Control Center (Attachment 3)
- Midland Air Traffic Control Tower (Attachment 4)
- Abilene Air Traffic Control Tower (Attachment 5)

Combined Aeronautical Study, Lancer MOA, August 28, 2000

Non-Rulemaking Decision Document, Lancer MOA, December 11, 2001

Rcd 9 Aug 99
Dc

U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: FAA Aeronautical Study on RBTI Proposal

Date: AUG 0 6 1999

From: Manager, Air Traffic Division, ASW-500

Reply to Attn. of: ASW-520.5

To: Southwest Region, USAF Representative, ASW-910

We have completed the aeronautical study for the Realistic Bomber Training Initiative (RBTI) as discussed in our meeting on June 8, 1999. As you recall, the focus of the aeronautical study was to help define the operational constraints and impacts associated with the proposed military operations areas (MOA); LANCER MOA and TEXON MOA.

Enclosed are the direct inputs from Fort Worth Air Route Traffic Control Center (ARTCC) (attachment 1), Albuquerque ARTCC (attachment 2), Houston ARTCC (attachment 3), Midland Air Traffic Control Tower (ATCT) (attachment 4), and Abilene ATCT (attachment 5). It is evident from these studies that the raw impacts on IFR and VFR traffic are significant with the expansion of the TEXON MOA. TEXON MOA would be limited in access and would be very rigidly managed with little or no capability to support expanded or delayed operations. The LANCER MOA proposal (with suggested modifications) has flexibility and is better suited to accommodate the designated activities as well as growth in mission activities and requirements.

Should you have any questions, please contact Mr. Don Day at 817-222-5593, or Mr. James Karanian at 817-222-5594.

Douglas R. Murphy

5 Attachments

QUICK FAX OfficeMax

Date: 8/4/99 # Of Pages: 15	
To: LT COL GARRETT	From: LT COL MADDEN
Co./Dept.: ACC/XORR	Co./Dept.: AFREP SW RGN
Fax:	Fax:
Phone:	Phone:
Note:	E-Mail:

ATTACHMENT 1

FORT WORTH AIR ROUTE TRAFFIC CONTROL CENTER
REMOTE BOMBER TRAINING INITIATIVE
ALTERNATIVE C: IR-178/TEXON MOA
AERONAUTICAL STUDY
July 28, 1999

1. INTRODUCTION.

a. PURPOSE. The purpose of this study is to determine the impact that Alternative C: Instrument Flight Rules Route (IR)-178/Texon Military Operating Area (MOA) of the United States Air Force's Remote Bomber Training Initiative (RBTI) will have on the air traffic system and the aviation community.

b. SCOPE. The Airspace and System Requirements Office of Fort Worth Air Route Traffic Control Center (ZFW) conducted this study in accordance with Order 7400.2, Procedures for Handling Airspace Matters, paragraph 27-8-SW1, Regional Action.

c. BACKGROUND. IR-178 was established for Instrument Meteorological Conditions/Visual Meteorological Conditions Terrain Following/Terrain Avoidance/Visual Contour operations carried out by B-1 and B-52 Bombers stationed at Dyess (DYS) Air Force Base (AFB) and Barksdale (BAD) AFB. It overlies a sizeable portion of southwestern Texas and a very small portion of New Mexico. The altitude block of IR-178 varies from 200 feet above ground level to 17,000 mean sea level, and the route width varies from 4 to 10 nautical miles. This initiative will not alter the structure of IR-178 within ZFW.

The proposed Texon MOA would be created by expanding the boundaries and altitudes of the existing Texon MOA as depicted in Attachment 1.

d. METHODOLOGY. Information was gathered from various National Oceanic and Atmospheric Administration charts and publications, which was relevant to the area of the proposed airspace, and analyzed to determine what facilities and current airspace configurations may be affected by the proposal. In addition, a random sampling of system analysis recording data was imported to the sector design analysis tool and analyzed for possible impacts on air traffic control services and air traffic operations.

2. AERONAUTICAL ACTIVITY.

a. COMMERCIAL AND GENERAL AVIATION. Activity within and around the area of the proposed Texon MOA includes arrival and departure traffic to and from the Abilene (ABI), Texas, Midland (MAF), Texas, San Angelo (SJT), Texas, Houston (IAH), Texas, and

Dallas/Fort Worth, Texas (DFW) terminal areas. Aircraft operations include air carrier, regional air carrier, air taxi, air ambulance and general aviation flights. A vast majority of this traffic navigates through most of the proposed Texon MOA airspace. During arrival and departure pushes at the IAH and DFW areas, a high concentration of traffic would be in and adjacent to the proposed MOA.

b. MILITARY ACTIVITY. Air Refueling routes (AR) 113/114 and 104 run east/west in the vicinity of the proposed Texon MOA. AR104 would lie inside the entire northern boundary of the MOA and the protected airspace of AR113/114 would be inside the northwestern corner of the MOA. Military aircraft from southern Texas transition to and from MAF and SJT daily utilizing the high instrument landing system (ILS) approaches at both airports. All of this military traffic transitions the area of the proposed Texon MOA.

3. INSTRUMENT FLIGHT RULES (IFR) AND VISUAL FLIGHT RULES (VFR) TERMINAL OPERATIONS.

a. ARRIVAL AND DEPARTURE FLOWS. Normal arrival and departure routing for the DFW terminal area is adjacent and parallel to the northern boundary of the proposed Texon MOA and during times of heavy arrival traffic much of it may be vectored through the proposed MOA. Normal routes to and from the Houston terminal area transition the area of the proposed MOA.

b. APPROACHES AND APPROACH PROCEDURES. Because the proposed MOA overlies some approach control airspace, approaches and approach procedures at these facilities would be significantly affected. At MAF the HI ILS RWY 10, HI VOR/DME or TACAN RWY 16R, and HI VOR/DME or TACAN RWY 34L would be unusable because the holding patterns for all would lie inside the proposed MOA. At SJT the HI ILS and HI TACAN RWY 3, ILS RWY 3, LOC BC RWY 21, NDB RWY 3, GPS RWY 3 and GPS RWY 21 would not be usable because the proposed MOA would penetrate either the holding pattern, it's protected airspace, or the procedure itself.

c. CLASS D AIRSPACE. There is no Class D Airspace that would be affected by this alternative.

4. AIRPORTS.

The proposed Texon MOA would directly affect one airport that lies within ZFW boundaries. Hughes is a private airfield underlying the central portion of the northern half of the proposed MOA.

Under this proposal, any VFR traffic into any of these fields would most likely be required to transition the lower altitudes of the MOA and various altitudes of IR-178.

5. IMPACT ON KNOWN VFR ROUTES/FLYWAYS.

a. OVERVIEW: Geographical terrain underlying the proposed Texon MOA is mostly west Texas plain land. Most VFR flyways and landmarks would be roads, rivers, towns and lakes, and would most likely not require restrictions to nonparticipating aircraft. These aircraft would, however, need to be made aware of MOA activity and be expected to maintain heightened awareness while transition the active MOA. Although low level radio coverage is sporadic in some areas and nonexistent in others, status of the activity could be obtained through the nearest automated flight service station or ZFW prior to transitioning the area.

b. VFR FLYWAYS UTILIZING MAJOR ROADS AND RAILWAYS: U.S. Highway 67, running east/west from San Angelo to Fort Stockton; State Highway 349, north/south from Midland, Texas to Rankin, Texas; State Highway 33, north/south from Garden City, Texas to Big Lake, Texas; and State Highway 163, north/south from Sterling City, Texas to Barnhart, Texas.

c. VFR FLYWAYS UTILIZING RIVERS, GEOGRAPHICAL LANDMARKS AND CITIES: The Middle Concho River runs east to west.

6. IFR EN ROUTE OPERATIONS.

a. MAF LOW ALTITUDE SECTOR.

(1) This sector contains altitudes from the surface to FL 230, and has an average daily IFR traffic count of 266 operations. Of this, 7 percent are air carrier, 33 percent are general aviation, 30 percent are military, and 30 percent are regional air carrier aircraft.

(2) The major traffic flow in the sector is east/west. This includes traffic to/from the DFW terminal area as well as the IAH terminal area. The DFW traffic is typically north of the proposed MOA, but all of the IAH terminal area traffic would normally transition this area, climbing or descending through most of the MOA altitudes. As many as two dozen of these aircraft would be impacted daily by this proposal, which would be considered a significant impact on this sector.

(3) There are no airports in this sector that would be impacted by this proposal.

b. Wink High Altitude Sector.

(1) This sector contains altitudes from the FL240 and above, and has an average daily IFR traffic count of 356 operations. Of this, 75 percent are air carrier, 10 percent are general aviation, 12 percent are military, and 3 percent are regional air carrier aircraft.

(2) The major traffic flow in the sector is east/west. This includes traffic to/from the DFW and Houston terminal areas. The DFW traffic is typically north of the proposed MOA, although during times of heavy arrival pushes a large portion would be vectored through the proposed MOA airspace. All of the Houston terminal area traffic would normally transition this area, some of it climbing or descending through most of the MOA altitudes. A large percentage of this sector's traffic would be impacted daily by this proposal, which would be considered a significant impact on this sector.

7. EFFECT ON EXISTING AIRWAY/JET ROUTE STRUCTURE.

a. FEDERAL VICTOR AIRWAYS. The only Federal Victor airway that would be affected by the Texon MOA is V68 between MAF and SJT. Aircraft wishing to use this airway when the Texon MOA is in use will need to be routed around the Texon MOA via radar vectors.

b. JET ROUTES. Jet routes affected by the proposed Texon MOA include J15 between Wink, Texas and Junction, Texas, J42 between Abilene, Texas and Fort Stockton, Texas, and J183 between Pecos, Texas and Llano, Texas. J42 is utilized by traffic between DFW and northwestern Mexico, while J15 and J183 are utilized by traffic between the IAH area and points west. MOA activity under this proposal would present a significant impact on these routes require substantial rerouting and possibly airspace restructuring.

c. GRAPHIC DEPARTURE PROCEDURES (DP's) AND STANDARD TERMINAL ARRIVAL ROUTES (STAR's). There are no DP's or STAR's affected by the proposed expansion of the Texon MOA.

8. CUMULATIVE IMPACT ASSESSMENT.

a. IFR OPERATIONS. This proposal would have a significant impact on high altitude IFR operations during proposed operating hours. This impact could only be addressed with major changes to IFR flight plans and airspace structure. The impact on instrument approach procedures at MAF and SJT would be significant and would affect a large percentage of operations at these facilities, effectively making them virtually inaccessible to many current customers.

b. VFR OPERATIONS. This proposal would impact VFR operations in the area of IR178 and the Texon MOA. The expansion of the Texon MOA will result in the loss of VFR altitudes in the area underlying the MOA.

9. IMPACT ON KNOWN AIRPORT DEVELOPMENT/EXPANSION PLANS, OTHER AIRSPACE PROPOSALS, RESECTORIZATION, AND OTHER POTENTIAL CONFLICTS.

There are no other known proposals or plans that would pose a potential conflict to this alternative of the RBTI proposal.

10. CAPABILITY OF CONTROLLING AGENCY TO PROVIDE SUA STATUS INFORMATION.

The Texon MOA and IR178 would be charted, and times of use noted on the charts. Real time traffic advisories and information could be obtained on the Midland low altitude sector frequencies. Radar coverage in the area is good, so traffic advisories should be available for all aircraft wishing to transit the area. Radio coverage is adequate and information regarding the MOA would be readily accessible.

11. SUMMARY.

Due to its major affect on commerical and military operations to and from the DFW, IAH, MAF, SJT areas, as well as military operations in AR-113/114, this proposal would have a significant impact on existing conditions and/or operations. Current airspace configuration and operations are not conducive to this proposal.

12. RECOMMANDATION.

It is recommended that his alternative not be considered for implementaion.

FORT WORTH AIR ROUTE TRAFFIC CONTROL CENTER
REMOTE BOMBER TRAINING INITIATIVE
ALTERNATIVE B: IR-178/LANCER MOA
AERONAUTICAL STUDY
July 28, 1999

1. INTRODUCTION.

a. PURPOSE. The purpose of this study is to determine the impact that Alternative B: Instrument Flight Rules Route (IR)-178/Lancer Military Operating Area (MOA) of the United States Air Force's Remote Bomber Training Initiative (RBTI) will have on the air traffic system and the aviation community.

b. SCOPE. The Airspace and System Requirements Office of Fort Worth Air Route Traffic Control Center (ZFW) conducted this study in accordance with Order 7400.2, Procedures for Handling Airspace Matters, paragraph 27-8-SW1, Regional Action.

c. BACKGROUND. IR-178 was established for Instrument Meteorological Conditions/Visual Meteorological Conditions Terrain Following/Terrain Avoidance/Visual Contour Operations carried out by B-1 and B-52 Bombers stationed at Dyess (DYS) Air Force Base (AFB) and Barksdale (BAD) AFB. It overlies a sizeable portion of southwestern Texas and a very small portion of New Mexico. The altitude block of IR-178 varies from 200 feet above ground level to 17,000 mean sea level (MSL), and the route width varies from 4 to 10 nautical miles. This initiative will alter slightly the structure of IR-178 within ZFW with the addition of two legs.

The Lancer MOA would be created by combining portions of three existing MOAs: Roby MOA, Reese 4 MOA, and Reese 5 MOA, and adjusting their boundaries. These areas are depicted in Attachment 1.

d. METHODOLOGY. Information was gathered from various National Oceanic and Atmospheric Administration charts and publications, which was relevant to the area of the proposed airspace, and analyzed to determine what facilities and current airspace configurations may be affected by the proposal. In addition, a random sampling of system analysis recording data was imported to the sector design analysis tool and analyzed for possible impacts on air traffic control services and air traffic operations.

2. AERONAUTICAL ACTIVITY.

a. COMMERCIAL AND GENERAL AVIATION. Activity within and around the area of the proposed Lancer MOA includes arrival and departure traffic to and from the Abilene

(ABI), Texas, Midland (MAF), Texas, Lubbock (LBB), Texas, Houston (IAH), Texas, and Dallas/Fort Worth (DFW), Texas terminal areas. Aircraft operations include air carrier, regional air carrier, air taxi, air ambulance, and general aviation flights. A vast majority of this traffic circumnavigates most of the proposed Lancer MOA, however, during arrival and departure pushes at the IAH and DFW areas, a high concentration of traffic is immediately adjacent to the proposed MOA.

b. MILITARY ACTIVITY. Sheppard AFB operates training missions in several MOAs to the east and northeast of the proposed Lancer MOA and Cannon AFB operates in MOA's to the west and northwest. These activities have no direct impact on the proposed Lancer MOA activities, but during times that all MOAs are active, non-military air traffic would have limited access to direct routing. The White Sands Missile Range exists well to the west of the area and impacts commercial and general aviation routing near the proposed Lancer MOA. A "shadow" of airspace relatively unusable for commercial aviation exists in the proposed Lancer MOA area due to the requirements to route nonparticipating traffic around the White Sands Missile Range.

3. INSTRUMENT FLIGHT RULES (IFR) AND VISUAL FLIGHT RULES (VFR) TERMINAL OPERATIONS.

a. ARRIVAL AND DEPARTURE FLOWS. Normal arrival and departure routing for the DFW terminal area is adjacent and parallel to the southern boundary and to the north and northeast of the proposed Lancer MOA. Normal routes to and from the Houston terminal area are nearly parallel and adjacent to the eastern boundary of the area of the proposed MOA.

b. APPROACHES AND APPROACH PROCEDURES. Although the proposed MOA overlies some approach control airspace, approaches and approach procedures at these facilities would not be affected. There are, however, public use airports with Instrument Approach Procedures (IAP) that would be affected by this proposal. Snyder/Winston Field has only one IAP available to this airport, the NDB or GPS RWY 35, which would be unusable during times of MOA activity. Lamesa Municipal (2F5) has two approaches, NDB or GPS RWY 16 and NDB or GPS RWY 34, which would be unusable during normal MOA activity. The missed approach procedure to the NDB or GPS RWY 17 approach to Avenger Field at Sweetwater could be impacted by the MOA.

c. CLASS D AIRSPACE. There is no Class D Airspace that would be affected by this alternative.

4. AIRPORTS.

The proposed Lancer MOA would directly affect the following airports:

5F1 – Post-Garza County Municipal Airport underlies the northwestern portion of the Lancer MOA. A small number of general aviation aircraft use this field for VFR activity.

2F4 – T-Bar Airfield underlies the far northwestern corner of the Lancer MOA. It is irregularly attended and supports a great deal of crop-duster activity during the summer and fall months.

2F5 – Lamesa Municipal lies on the southern portion of the western boundary of the proposed MOA. The field is attended six days a week and supports general aviation VFR and IFR activities, as well as a powerplant repair facility.

SNK – Winston Field, underlying the southeast quadrant of the MOA is attended daily and supports fuel and other services for VFR and IFR operations.

56F – Fisher County lies just inside the eastern boundary of the proposed Lancer MOA and is unattended. It supports light VFR activities and intensive seasonal agricultural VFR activity.

22F – Kent County, which lies just inside the eastern portion of the northern boundary of the MOA, is unattended and supports very minimal VFR traffic. Beggs is a private airfield underlying the central portion of the northern half of the MOA.

21XS – Big Spring, which lies to the south of the proposed MOA and west of the proposed IR178, is attended seven days a week and supports a modest amount of VFR and IFR traffic.

Under this proposal, any VFR traffic into any of these fields would most likely be required to transition the lower altitudes of the MOA and various altitudes of IR-178. Any IFR traffic would not be able to access most airports with instrument approach procedures (IAP's) during MOA activity, as the IAP's would be unusable. Aircraft using 21XS to/from the east would not be able to make normal climbs and/or descents during times that IR-178 is active, and would require vectors to the north or south of the airport until clear of IR-178.

5. IMPACT ON KNOWN VFR ROUTES/FLYWAYS.

a. OVERVIEW. Geographical terrain underlying the proposed Lancer MOA is mostly west Texas plain land. Most VFR flyways and landmarks would be roads, rivers, towns and lakes, and would most likely not require restrictions to nonparticipating aircraft. These

aircraft would, however, need to be made aware of MOA activity and be expected to maintain heightened awareness while transition the active MOA. Although low level radio coverage is sporadic in some areas and nonexistent in others, status of the activity could be obtained through the nearest automated flight service station or ZFW prior to transitioning the area.

b. VFR FLYWAYS UTILIZING MAJOR ROADS AND RAILWAYS. U.S. Highway 84, running northwest/southeast from Roscoe to Lubbock; U.S. Highway 87, running north/south from Big Spring to Lubbock; U.S. Highway 180, east/west from Anson to Lamesa; and State Highway 70, northwest/southeast from Sweetwater to Jayton.

c. VFR FLYWAYS UTILIZING RIVERS, GEOGRAPHICAL LANDMARKS AND CITIES. The Double Mountain Fork of the Brazos River runs northwest to southeast.

6. IFR EN ROUTE OPERATIONS.

a. ABILENE LOW ALTITUDE SECTOR.

(1) This sector contains altitudes from the surface to FL 230, and has an average daily IFR traffic count of 295 operations. Of this, 3 percent are air carrier, 33 percent are general aviation, 30 percent are military, and 34 percent are regional air carrier aircraft.

(2) The major traffic flow in the sector is east/west. This includes traffic to/from the DFW terminal area. This traffic is generally south of the proposed Lancer MOA, and approximately five aircraft per day, during proposed usage hours, traverse the area over which the Lancer MOA would lie. Therefore, this proposal would pose little impact upon most of the traffic in this sector.

(3) Winston Field at Snyder, Texas, is one of two airports in this sector that would be impacted by this proposal. Operations in and out of this airport are approximately six per week, and although MOA activity would render IFR activities impossible, the impact would be negligible, as these activities are most generally VFR. Fisher County, lying just inside the eastern boundary of the MOA and supporting VFR operations, would be impacted negligibly.

b. MIDLAND LOW ALTITUDE SECTOR.

(1) This sector contains altitudes from the surface to FL 230, and has an average daily IFR traffic count of 266 operations. Of this, 7 percent are air carrier, 33 percent are general aviation, 30 percent are military, and 30 percent are regional air carrier aircraft.

(2) The major traffic flow in the sector is east/west. This includes traffic to/from the DFW terminal area. This traffic is south and southwest of the proposed Lancer MOA, and approximately five aircraft per day, during proposed usage hours, traverse the area over which the Lancer MOA would lie. More than half of the traffic in this sector would cross the proposed new portion of IR178 in the eastern half of this sector, most being above the proposed altitudes of the IR route. IFR traffic inbound or outbound to/from Big Spring, or transitioning to/from Midland and San Angelo would be impacted. These activities would number approximately twelve per day. Therefore, this proposal would pose a minimal impact on the traffic in this sector.

(3) There are no airports in this sector that would be impacted by this proposal.

c. REESE LOW ALTITUDE SECTOR.

(1) This sector contains altitudes from the surface to FL 230, and has an average daily IFR traffic count of 150 operations. Of this, 20 percent are air carrier, 37 percent are general aviation, 19 percent are military, and 24 percent are regional air carrier aircraft.

(2) The major traffic flow in the sector is more or less north/south. This traffic is generally west of the proposed Lancer MOA, and approximately five aircraft per day, during proposed usage hours, traverse the area over which the Lancer MOA would lie. Therefore, this proposal would pose little significant impact upon most of the traffic in this sector.

(3) Three airports in this sector would be affected by this proposal. Post-Garza is a VFR only airport with minimal operations would realize an insignificant impact. T-Bar is also VFR only and most of the activity at this field is crop dusters during the summer and fall months. Because it lies just inside the western MOA boundary, the impact would not be significant. Lamesa is the only airport in this sector that supports IFR operations. Lying on the western boundary of the proposed MOA, it would be accessible under VFR conditions. During usage times of the MOA, however, any IAPs would not be usable and access to the airport under IFR conditions would not be possible when the MOA is active. Because IFR operations at Lamesa number approximately five per month, the impact would be minimal.

d. LUBBOCK LOW ALTITUDE SECTOR.

(1) This sector contains altitudes from the surface to FL 230, and has an average daily IFR traffic count of 200 operations. Of this, 23 percent are air carrier, 35 percent are general aviation, 21 percent are military, and 21 percent are regional air carrier aircraft.

(2) The major traffic flow in the sector is east/west. This includes traffic to/from the DFW terminal area. This traffic is north of the proposed Lancer MOA, as the only portion of the sector which contains any part of MOA airspace is in the far southeast corner. However, traffic transitioning between the LBB and ABI areas utilize V385, and the north/south traffic in the sector utilizes J17. Both of these routes lie in the northeastern corner of the proposed MOA. There is no viable alternative to the usage of these routes and adjustments would need to be made to the proposed MOA boundaries.

(3) The only airport in this sector affected by this proposal is Kent County. It supports VFR traffic and radio coverage in the area is marginal.

e. WINK HIGH ALTITUDE SECTOR.

(1) This sector contains altitudes from the FL240 and above, and has an average daily IFR traffic count of 356 operations. Of this, 75 percent are air carrier, 10 percent are general aviation, 12 percent are military, and 3 percent are regional air carrier aircraft.

(2) The major traffic flow in the sector is east/west. This includes traffic to/from the DFW and Houston terminal areas. This traffic is generally south of the proposed Lancer MOA. During proposed usage hours, there would be several periods of heavy commercial aviation traffic traversing the area adjacent to the proposed Lancer MOA. At times this traffic would need to be vectored through the MOA for sequencing and fix balancing into the DFW terminal area. Therefore, this proposal would pose a very slight impact upon a portion of the traffic in this sector.

f. TURKI HIGH ALTITUDE SECTOR.

(1) This sector contains altitudes from the FL240 and above, and has an average daily IFR traffic count of 479 operations. Of this, 80 percent are air carrier, 9 percent are general aviation, 6 percent are military, and 5 percent are regional air carrier aircraft.

(2) The major traffic flow in the sector is east/west. This includes traffic to/from the DFW and Houston terminal areas. This traffic is generally north of the proposed Lancer MOA, with the exception of one departure transition which traverses the northern portion of the proposed MOA, and J17 which traverses the northeastern corner of the proposed MOA. During proposed usage hours, there would be several periods of heavy commercial aviation traffic traversing the northern portion of the proposed Lancer MOA above FL240. At other times, traffic would need to be vectored through the MOA for sequencing and fix balancing into the DFW terminal area. Therefore, this proposal would pose a very significant impact upon most of the traffic in this sector.

g. ABILENE HIGH ALTITUDE SECTOR.

(1) This sector contains altitudes from FL240 and above, and has an average daily IFR traffic count of 542 operations. Of this, 78 percent are air carrier, 12 percent are general aviation, 4 percent are military, and 6 percent are regional air carrier aircraft.

(2) The major traffic flow in the sector is east to west. This includes departure traffic from the DFW terminal area. This traffic is north and south of the proposed Lancer MOA, and also includes one route that transitions the MOA. A few times during the normal weekday departure pushes are heavy and MOA activity could have a very significant impact on this sector. During lighter departure pushes, it is conceivable that an alternative route could be used to circumnavigate the MOA.

7. EFFECT ON EXISTING AIRWAY/JET ROUTE STRUCTURE.

a. FEDERAL VICTOR AIRWAYS. The Federal Victor airways that are affected by the Lancer MOA include V385 between BOOMR intersection and Abilene; V62 between Lubbock and Abilene; and V563 between Lubbock and Big Spring. Aircraft wishing to use these airways when the Lancer MOA is in use will need to be routed around the Lancer MOA via radar vectors. Federal Victor airways affected by the expansion of IR-178 include: V16 between Abilene and Big Spring; V76 between San Angelo and Big Spring; V66-94 east and west of the HYMAN intersection; and V68 between San Angelo and Midland. Aircraft wishing to use these airways during IR-178 activity would be required to climb above the altitudes of the IR route. The MOA activity would impact approximately a dozen aircraft per day. IR route activity would impact about the same number of aircraft.

b. JET ROUTES. Jet routes affected by the proposed Lancer MOA include J17 between Abilene and DUMPS intersection, and J65 between Abilene and Chisum. J17 cuts across the northeastern corner of the MOA and aircraft on this route could be vectored around the active MOA with minimal effort. J65 is normally not used during the proposed operating hours of the Lancer MOA due to the White Sands Missile Range. These routes would be impacted very minimally by this proposal.

GRAPHIC DEPARTURE ROUTES (DP's) AND STANDARD TERMINAL ARRIVAL ROUTES (STAR's). The following DP's and STAR's would be affected by the proposed expansion of IR-178 or the Lancer MOA:

COYOTE FOUR DEPARTURE, LUBBOCK TRANSITION – from KIRST intersection to Lubbock this SID would transition the northeast corner of the MOA.

WORTH TWO DEPARTURE, LUBBOCK TRANSITION – from KIRST intersection to Lubbock this SID would transition the northeast corner of the MOA.

8. CUMULATIVE IMPACT ASSESSMENT.

a. IFR OPERATIONS. This proposal would have a significant impact on high altitude IFR operations during specific time periods. At other times and at lower altitudes, the impact of the proposed Lancer MOA and expansion of IR-178 would have little impact on IFR operations. This impact could be addressed with minimal changes to IFR flight plans, with altitude or route changes. The inaccessibility of the few affected airports would impact a very small number of operations, and could be addressed by temporarily blocking altitudes in portions of the MOA.

b. VFR OPERATIONS. This proposal would impact VFR operations in the area of IR-178 and the Lancer MOA. The creation of the Lancer MOA will result in the loss of VFR altitudes in the area underlying the MOA, and to a greater degree, the area of IR-178.

9. IMPACT ON KNOWN AIRPORT DEVELOPMENT/EXPANSION PLANS, OTHER AIRSPACE PROPOSALS, RESECTORIZATION, AND OTHER POTENTIAL CONFLICTS.

There are no other known proposals or plans that would pose a potential conflict to this alternative of the RBTI proposal.

10. CAPABILITY OF CONTROLLING AGENCY TO PROVIDE SUA STATUS INFORMATION.

The Lancer MOA and IR-178 would be charted, and times of use noted on the charts. Real time traffic advisories and information could be obtained on the Reese, Abilene, and Midland low altitude sector frequencies. Radar coverage in the area is good, so traffic advisories should be available for all aircraft wishing to transit the area. There is limited radio coverage in the southeastern portion within the MOA. Coverage is adequate from the boundaries outward and any information could be obtained before entering the MOA.

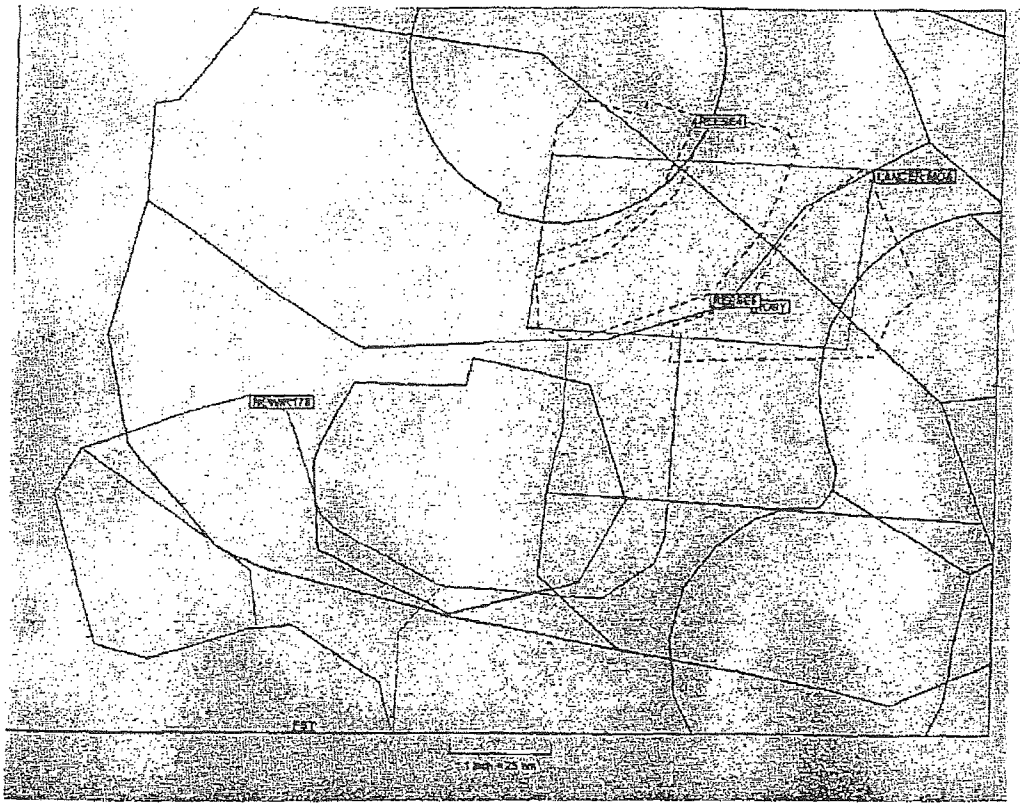
11. SUMMARY.

Although there could be a significant impact at various times during the day, adjustment(s) could be made to the MOA boundaries and operating hours that would significantly reduce the impact on existing conditions and/or operations. Current airspace configuration and operations have created a portion of airspace that would be practical to be used as proposed a majority of the time.

12. RECOMMENDATION.

It is our recommendation that this alternative be implemented with changes to the MOA boundaries as depicted in Attachment 2 and operating hours that do not conflict with peak periods of arrival and departure commerical traffic to and from the DFW and IAH areas.

Remote Bomber Training Initiative
Alternative B: IR-178/Lancer MOA



The Roby MOA is located in west Texas and extends from 12,000 feet MSL to, but not including Flight Level (FL) 180, with an associated Air Traffic Control Assigned Airspace (ATCAA) extending from FL180 through FL230. It contains a portion of Abilene (ABI) Approach Control airspace as well as portions of ZFW ABI-L, MAF-L, and REE-L sectors. The Roby MOA was established for the purpose of bomber pilot training and is currently used as such by Dyess AFB.

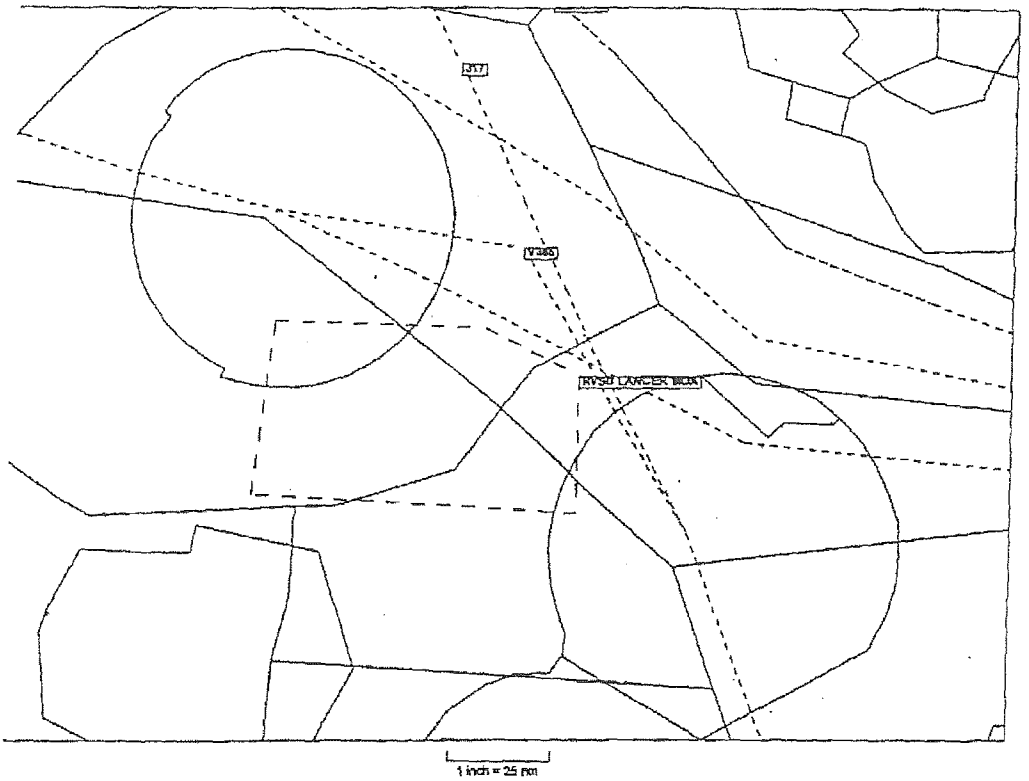
The Reese4 MOA is also located in west Texas and extends from 10,000 feet MSL to, but not including FL180. The associated ATCAA extends from FL180 through FL230. It contains portions of Lubbock (LBB) Approach Control airspace as well as a portion of ZFW REE-L sector. Reese4 MOA was established for the purpose of T-37 and T-38 NATO student pilot training and was used as such until the closure of Reese AFB. It is currently used by Altus AFB for the same purpose.

The Reese5 MOA is located between the Roby and Reese4 MOAs, with altitudes and uses similar to Reese4. It contains portions of ZFW REE-L sector. Currently Reese5 MOA is not in use due to a lack of procedures.

# Of Pages 11	QUICK FAX OfficeMax
Lt Col Garrett	From: Lt Col Madden
Dept. ACC/XORR	Co./Dept.
	Fax:
	Phone:
	E-Mail:

Attachment 1

Remote Bomber Training Initiative
Alternative B: IR-178/Lancer MOA



By altering the northeastern corner of the proposed Lancer MOA as depicted above, MOA activity would not impact traffic on J17, v385 or the Lubbock transition of the Worth 2 Departure Procedure.

ATTACHMENT 2

Author: James Karanian at ASW500P0
Date: 08/04/1999 7:55 AM
Subject: ZAB's Input on RBTI

Forward Header

Subject: ZAB's Input on RBTI
Author: David Wingert at ASWZABAT
Date: 8/3/99 2:36 PM

Bob & James,

Albuquerque Center has completed our review of Alternatives B and C for the Realistic Bomber Training Initiative (RBTI) that were attached to the ASW-500 memo dated 6/9/99. Prior to the memo, we received a copy of the RBTI Draft Environmental Impact Statement (EIS). We suspected Alternative A (No-Action) was not acceptable to the Air Force and we opposed Alternative D due to its adverse impact on the NAS. We have always considered Alternatives B and C as the best options. We are accustomed to working a lot of traffic into and on IR-178. As far as establishing the Lancer MOA or the Texon MOA, we will defer to the recommendations of our good friends at ZFW and ZHU. In summary, Albuquerque Center can accommodate either Alternative B or Alternative C. Please contact me at (505) 856-4530 if you have any questions or need additional information.

Dave Wingert
Support Manager, Airspace & Procedures

for

Joan Mallen
Air Traffic Manager

HOUSTON CENTER AERONAUTICAL STUDY OF AIRSPACE IMPACT ANALYSIS FOR REALISTIC BOMBER TRAINING INITIATIVE (RBTI) IN THE TEXON MOA/ATCAA

Houston Air Route Traffic Control Center has been tasked to assess the aeronautical impact on the National Airspace System in the vicinity of the Texon Military Operations Area (MOA) for an Airspace Impact Analysis for Realistic Bomber Training Initiative (RBTI). This study will provide the basis for determining the impact of the proposed special use airspace (SUA) on the safe and efficient utilization of airspace, and the movement and control of air traffic (VFR and IFR) in the area.

A. Describe the type and volume of existing aeronautical activity in the area encompassed by the proposal.

Houston, Albuquerque, and Fort Worth ARTC Centers are the controlling agencies in the area of the affected airspace. The predominant traffic in the area is air carrier operations en route to Austin/Bergstrom, Houston George Bush Intercontinental, and Houston Hobby airports along J183. The majority of this traffic is at FL270 and above. There are approximately 60-70 flight operations in the area between 0800 and 1800 CDT.

B. Describe the impact on both IFR and VFR terminal operations:

1. Arrival and departure flows.

No impact.

2. Approaches and approach procedures.

Operations in the area at and below FL230 will affect Laughlin AFB aircraft executing LOUBY penetrations from the SJT241018. The area will also infringe upon Midland Approach Control airspace in the San Angelo area at and below 12,000 feet.

3. Control zones, airport traffic areas.

No impact.

C. Public-use and private airports:

1. Number and types of aircraft based.

N/A

2. Volume of operations.

N/A

3. **Effect on airport access, capacity, and operations.**

N/A

D. **Impact on known VFR routes/flyways; include average number of operations for each route.**

No impact.

E. **Impact on IFR en route operations.**

The major impact will be on the 60-70 aircraft that are en route to the Houston and Austin terminal areas between FL270 and FL370. Approximately 10-20 aircraft transiting between JCT/RSG and MAF will also be affected.

F. **Effect on existing airway/jet route structure:**

Aircraft operating along J183 would need to be re-routed over J2/J86 between FST and JCT.

1. **Average daily traffic count on affected airways/routes.**

Approximately 60 to 70 operations per day.

2. **Requirement for and suitability of airway/route realignment.**

N/A

G. **A cumulative impact assessment to estimate the combined effect of the proposed SUA in conjunction with:**

1. **Existing adjacent airspace such as terminal control areas, or other SUA.**

Midland Approach Control, at San Angelo airport, would be affected in the western portion at and below 12,000 feet..

2. Conditions which would make circumnavigation of the proposed SUA impossible or impractical. Consideration to the compression of air traffic and impact on air safety.

It would be impractical to circumnavigate the area due to traffic congestion. Circumnavigating to the south would put traffic in a head on situation with aircraft westbound along J2/J86, most often climbing to cruise altitude, and to the north with aircraft in Fort Worth Center airspace en route to the DFW terminal area.

H. Impact on known airport development/expansion plans, other airspace or airway proposals, resectorization, or other potential factors which could be affected by the proposal.

No impact.

I. Capability of the controlling agency or other air traffic control facility to provide:

1. Real time SUA status information.

Houston ARTC Center, as the controlling agency, would provide real time SUA status.

2. Transit through the area.

IFR traffic transiting the area would need to be coordinated through the controlling agency.

3. Traffic advisories to nonparticipating pilots requesting such service. If capability exists, provide facility identification(s) and frequency(ies) for publication on aeronautical charts.

Houston ARTC Center on 125.75/346.4 or Fort Worth ARTC Center on 126.15/322.55.

orig 520

501/500

ATTACHMENT 1

Memorandum

U.S. Department
of Transportation
Federal Aviation
Administration

Midland Air Traffic Control Tower
P.O. Box 60080
Midland International Airport
Midland, Texas 79711-0080

JUN 30 AM 11:25 ASW 500

Subject: INFORMATION: Airspace Impact Analysis of Realistic Bomber Training Initiative (RTBI) Proposal

Date: June 22, 1999

From: Air Traffic Manager, MAF-500

Reply to Attn. of:

To: Manager, Air Traffic Division, ASW-500

Midland ATCT does not foresee any impact to our operations from the proposed formation of the Lancer MOA or the changes to IR-178 (Alternative B).

The proposed modification of the Texon MOA (Alternative C) would have the following adverse effects:

Midland Approach Airspace.

- HI ILS RWY 10 – The protected airspace for the holding pattern at CRANE and DERIC would be penetrated when the MOA was active. The Feeder route from SJT to BRNET would also be blocked.

- HI VOR/DME or TACAN RWY 16R – The holding pattern at DERIC would be penetrated when the MOA was active.

- HI VOR/DME or TACAN RWY 34L – The effects of the MOA would be the same as to the HI ILS RWY 10 approach.

- The majority of our military traffic to Midland comes from Laughlin AFB in Del Rio Texas. Flying around this MOA would add significantly to the length of this flight, using fuel that could be used for practice approaches and VFR pattern practice.

San Angelo Airspace. This MOA would come to within 9 NM (approx.) from the SJT airport and block most of the western side of the Approach Control Airspace from approximately 5000 feet mean sea level to flight level 180. It would have the following effects:

- V68 and V76 will be blocked when the MOA is active.

- HI ILS and HI TACAN RWY 3 – LOUBY, RANGE, and BONNY are inside the proposed MOA. The MOA penetrates the protected airspace for the holding pattern at TANKR. These are currently the only High Approaches to SJT.

- ILS RWY 3 – the 15 mile arc west of SJT and the holding pattern at WOOLE would be inside the proposed MOA.
- LOC BC RWY 21 – The MOA penetrates the protected airspace for the holding pattern at WOOLE.
- VOR RWY 21 – no effect
- NDB RWY 3 - The MOA penetrates the protected airspace for the holding pattern at WOOLE. This also effects the missed approach (it is a right turn back to WOOLE).
- GPS RWY 3 – APDOW waypoint is inside the proposed MOA.
- GPS RWY 21 – The protected airspace for the holding pattern at HEXPE is penetrated by the MOA.
- A direct route between San Angelo and Midland would be blocked when the MOA is active.

As in the previous recommendation (Alternative B) we have no objection to the changes to IR 178.

We oppose the expansion of the Texon MOA (Alternative C). Our opposition to this proposal is based upon the serious impact that this proposal would have to IFR operations at MAF and SJT.

Mike Jackson

ATTACHMENT 5

AUG03 AM10:58 ASW520

Memorandum

U.S. Department
of Transportation

**Federal Aviation
Administration**

ABILENE ATCT/TRACON
2909 WEST ACCESS DRIVE
ABILENE, TEXAS 79602

Subject: ACTION: Informal Airspace Impact Analysis
For Realistic Bomber Training Initiative (RBTI)

Date: August 2, 1999

From: Manager, ABI ATCT

Reply to Attn of: R. Cevallos

To: Manager, Air Traffic Division, ASW-500

Thru: Manager, Airspace Branch, ASW-520

An informal airspace impact analysis was completed in support of the Realistic Bomber Training Initiative. The following are some of the facts considered prior to our recommendation.

1. The Lancer MOA will replace the Roby MOA.
2. Only a small portion the Lancer MOA will be within Abilene Airspace.
3. The surface of Lancer MOA will be 3000ft. The surface of Roby is 12,000ft.
4. Dyess AFB plans to schedule up to 9 operations in the Lancer MOA each day.
5. The Lancer MOA will be active for up to one hour at a time.
6. Traffic conducting instrument approaches at Sweetwater airport will be affected.
7. Local C130 training missions will be affected while the MOA is active.
8. Traffic between Abilene and Lubbock will be affected, the main route connecting MAF and LBB is V62 (ABI296R).
9. IFR traffic between Abilene and Lubbock would have to be diverted by at minimum of 50 miles.
10. The MVA in the northwest quadrant of ABI airspace is 4000ft.
11. Total daily traffic between Abilene and Lubbock is approximately 5 % of Abilene traffic. This includes scheduled flights by Federal Express with a minimum of 3 morning and 3 evening flights.

Abilene has two proposals we wish to have considered:

1) To prevent delays to aircraft flying between Abilene and Lubbock, the Lancer MOA be divided into 2 sections, with the dividing line parallel to victor 62 west of the protected airspace for the airway. This would establish a corridor for civil aircraft to pass between the split MOA.

2) Using the same dividing line parallel to V62, the west section base altitude of the Lancer would remain 3000ft and above. The east section base altitude would begin at 7000ft. This would allow both IFR and VFR traffic to fly under the MOA without any delays. This would be advantageous to military training because vertical altitude is safer and easier to accomplish.

Abilene approach control prefers the #2 proposal since that would give civil pilots utilizing V62 full consideration. We believe that this would also allow the military pilots adequate airspace to fulfill their training missions with the least amount of distraction.

Abilene is committed to an amicable solution and is very willing to resolve this issue with full consideration to all parties involved. Thank you for allowing us an opportunity to give input. If you have any questions or concerns, please contact Ricardo Cevallos or myself at 915-675-8200.

Denise L. Beck

COMBINED AERONAUTICAL STUDY
LANCER MILITARY OPERATIONS AREA (MOA)
2000-ASW-01-NR
AUGUST 28, 2000

1. Introduction.

A. Purpose. This purpose of this document is to establish a factual baseline from which to assess the Lancer MOA proposal.

B. Scope. The studies were conducted in accordance with FAA Order 7400.2, Procedures for Handling Airspace Matters, paragraph 27-8-SW1, Regional Action.

C. Background. In comparing the studies from the facilities and comments from our flight procedures development branch, the region discovered some assumptions that contained incorrect information. Some of these include impacts to instrument approach and departure capabilities at airports underlying the proposed MOA. Some incorrectly state the current radar and communication capabilities related to the proposed MOA. Also, facility studies include incorrect information related to the number and type of aircraft impacted by the proposed MOA and the distances added to flight tracks when the MOA is actually in use by the military.

D. Methodology. This study combines the aeronautical studies submitted by Lubbock Air Traffic Control Tower (ATCT), Abilene ATCT, and Fort Worth Air Route Traffic Control Center (ARTCC). The study reconciles conflicting information by using engineering studies, flight procedures verification, and further analysis.

E. This combined aeronautical study attempts to reconcile discrepancies, conflicting information, reduce the detail of some of the facility inputs, and clarify the magnitude and nature of aeronautical impacts necessary to administer in the public interest for the safe and efficient utilization of the proposed airspace.

2. Aeronautical Activity.

A. Commercial Activity. The proposed Lancer MOA potentially impacts some commercial operations into and out of Lubbock International (LBB) and Abilene Municipal (ABI) airports. Commercial operations between Lubbock, Houston, and Austin would be impacted when the MOA is in use. These operations are focussed on flows to and from the southeast between Lubbock and Abilene or the Llano vicinity. Direct routing between LBB and ABI VORTAC is 121.5 nm. Rerouting to the east to avoid the Lancer MOA would increase this distance by 8.5 nm. Direct routing between LBB and the Llano area (LLO for Austin and Houston destinations) is 231 nm. Rerouting to the east to avoid the MOA should it

be in use would add 14 nm to the total distance. Aircraft arriving and departing between LBB and the DFW area would be minimal, if at all.

B. General Aviation. General aviation (IFR and VFR) could be impacted when destinations are to the south and southeast of Lubbock. VFR operations are impacted only when the area is in use by the military and pilots elect not to fly through the MOA. The floor of the MOA is proposed to be 3000 feet AGL, therefore it is possible to maintain more direct routing or along landmark navigation tracks below the MOA. The proposed Lancer MOA is joint use in that VFR aircraft are not denied access and IFR aircraft may be routed through the airspace when approved separation can be provided from MOA activity. General Aviation activities associated with underlying public use airports will be discussed later in this study.

C. Military Activity. The proposed Lancer MOA utilizes much of the charted Reese 4, Reese 5, and Roby MOAs. Reese 4 has been used by some USAF units for airwork training and several units continue to use LBB for instrument and transition training. The Lancer proposal creates a MOA with a floor at 3,000 AGL (roughly 6,000 MSL), which is lower than the published floor of the Reese 4, 5, and Roby MOA's. The floor of these MOA's are 10,000 MSL, 12,000 MSL and 12,000 MSL and the use of these areas for military training have been limited since the closing of Reese AFB. The proposed Lancer MOA will revoke the Reese 4, 5, and Roby MOA's; thereby reducing the lateral boundaries of the charted airspace. The Bronco MOAs were established to the West of Lubbock to accommodate military training originating from Cannon AFB. Sheppard AFB based pilot training aircraft use the Westover MOA's located about 80 nm east of LBB.

3. **Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) Terminal Operations.**

A. Instrument Approach and Departure Procedures. The proposed Lancer MOA with a floor of 3,000 AGL does not affect any instrument approach or departure procedures for LBB, ABI, Lamesa Municipal Airport, Snyder Winston Field, nor Sweetwater Avenger Field. Feeder routes and minimum IFR altitudes to these approaches will not require modifications. IFR service will be maintained at these airports. When the MOA is in use and requested IFR altitudes are not available, the controlling agency will offer altitudes and routes to circumnavigate the activity.

B. IFR Activity. Federal airway V-62 would not be available and other direct routings to the South and Southeast would be impacted when the MOA is in use. Aircraft departing DFW area via Worth 2 Departure (Lubbock transition) would likewise be impacted primarily by the airspace above the

proposed MOA. It may be feasible to retain V-62 and identify an airway routing that will more closely circumnavigate the MOA lateral boundaries such as altering V-385 and the BOOMR intersection to the South. Opportunity for radar vectoring at any altitude impacted by the use of the MOA is unaffected.

C. VFR Activity. VFR aircraft may choose to fly through the MOA when it is in use. They may request and receive flight following and traffic advisories. Radar and communications are available throughout the MOA. Likewise VFR aircraft may choose to fly below or around the MOA when it is in use. Geographic terrain underlying the proposed Lancer MOA is mostly West Texas Plains. Most VFR flyways and landmarks would be roads, rivers, towns and lakes. Some aircraft utilizing these flyways would be impacted. VFR aircraft may request flight following and the real time status of the use of the MOA or choose to fly through the MOA when it is in use without contacting the controlling agency. There appear to be good physical references along the border of the MOA such as highways, powerlines, rivers, airports and lakes should pilots choose to circumnavigate the MOA for any reason.

4. AIRPORTS.

The proposed Lancer MOA overlies the following public use airports:

5F1- Post Garza County Municipal Airport is used by general aviation aircraft for VFR activity. (Distance to closest MOA boundary is 3 nm)

2F4- Tahoka T-Bar Airfield is attended irregularly. Supports general aviation VFR activity and seasonal agricultural activity. (Distance to closest MOA boundary is 4 nm)

2F5- Lamesa Municipal lies on the western boundary and supports general aviation VFR and IFR activities. (Distance to closest MOA boundary is 1 nm)

SNK- Snyder Winston Field supports general aviation VFR and IFR activities. (Distance to closest MOA boundary is 7 nm)

56F- Fisher County is on the eastern boundary and it supports VFR activities and seasonal agricultural VFR activity. (Distance to closest MOA boundary is 2 nm)

22F- Kent County is on the northern bounday and supports VFR activity. (Distance to closest MOA boundary is 2 nm)

5. **Aircraft Operations Potentially Impacted by the Proposed MOA.**

A. The following is an assessment of current activity based upon the number of aircraft penetrating Lancer MOA that have filed flight plans and flown through the MOA on a

generic flight day any time between 0900 and midnight during a week day.

(1) 48 aircraft penetrate the Lancer boundaries. Of these 7 are climbing, 12 are descending, and 29 cruising. Peak activity around 0200 pm.

(2) 10 aircraft departures and 13 arrivals at Lubbock transit the planned MOA. (includes 2/SWA, 6/BTA, 3/EGF)

(3) 3 aircraft penetrate the Lancer MOA enroute to or departing from Big Spring MacMahon-Wrinkle Airport (T49)

(4) 25 aircraft represent thru-flights not related to Lubbock or Abilene activity

6. **RADIO AND RADAR COVERAGE OF THE PROPOSED LANCER MOA.**

A. VHF radio coverage extends throughout the proposed Lancer MOA above 6,000 ft. MSL (3000 ft. AGL.)

B. UHF radio coverage currently exists within the MOA and coverage throughout the airspace will be necessary to maintain controller contact with all participating military aircraft.

C. Radar coverage extends throughout the MOA at or above 5,000 ft. MSL. This altitude is approximately 1,000 feet below the floor of the proposed MOA.

7. **CUMULATIVE IMPACT ASSESSMENT.**

A. Commercial IFR Operations. The proposed MOA and the Air Traffic Controlled Assigned Airspace (ATCAA) overlying the Lancer MOA would have an impact on IFR aircraft traversing the airspace, when the airspace is being used by military aircraft for the intended training. The character of air traffic of this area is dominated by traffic flows arriving and departing DFW. The primary flows in the vicinity of the proposed MOA are east and west at altitude. Flows generally reflect avoidance of the White Sands Missile Range (WSMR) in Central New Mexico. There are growing operations flowing northwest to southeast resulting from growing markets to and from Houston and Austin areas. The DFW operations have long been impacted by the Westover MOA's therefore routes have evolved and refined over the years. Similar actions have evolved with WSMR. The Bronco MOAs to the west of the proposed Lancer MOA lie within the shadow of WSMR and have floors and corridors to aid in the transit opportunities. However, Lancer MOA and the associated ATCAA is an undivided piece of airspace extending from 3,000 ft AGL up to Flight Level (FL)400. The forecast uses of the MOA and ATCAA reflect relatively low usage numbers and the training is considered to be limited to various select blocks of airspace, without use of the full piece of the airspace. This mandates the USAF

flying unit, the FAA controlling agency, and the flying community will have to schedule, communicate and offer services and consolations for the airspace to be efficiently managed and used.

B. VFR Operations. This proposed airspace will impact VFR operations primarily based upon the lower floor of the MOA and the pilot's election to fly around the MOA should it be in use by the military. VFR flight following should normally be requested and available to assist VFR aircraft wishing to transit the airspace. Radar and communications coverage exists to provide this service. Many fixed base operators which offer fuel and other transient services comment that the airspace complexity drives potential customers to other locations to avoid the areas. The impact that this has on these operations must be part of the consideration for establishing any special use airspace.

C. Airport and Airport Development. Because of the distances between airports and cities in this west Texas area, the value of aviation services to support growth and development is greater. Maintaining IFR procedures and limiting the impact to IFR and VFR services must also be considered in this process.

8. **SUMMARY.**

The purpose of the combined aeronautical study is to collectively review the aeronautical comments from the facilities and to provide a baseline of information and areas of concern that will need to be addressed as we review comments from the impacted aviation community. Further considerations as to which facilities are best suited to provide FAA services to aircraft with both IFR and VFR flight tracks penetrating the proposed airspace must be addressed. Likewise, vertical subdivisions, lateral boundary adjustments, equipment requirements, and utilization schedules must be worked with the military and the impacted aviation community. Additionally, depending upon exact issues and questions that arise in the process, the FAA acknowledges that any part of this general study may require more indepth analysis and further investigation.

ORIGINAL SIGNED BY
ROBERT N. STEVENS

Robert Stevens
Manager, Airspace Branch,
ASW-520

Attachments
Lubbock ATCT Aeronautical Study
Fort Worth ARTCC Aeronautical Study
Abilene ATCT Aeronautical Study

Flight Procedures IFR Analysis
Frequency Management- Communications Coverage

ASW-5205:DDay:dd:817-222-5593:08/14/00(520View/ COMLNCRSTDY.
File: 2000-ASW-01-NR (w/Dday)

Non-Rulemaking Decision Document

Lancer MOA, TX

Source: ATA-400

December 11, 2001

Non-Rulemaking Decision Document

I. Summary

II. Authority

III. Military Operations Areas

IV. Supplemental Information

V. Environmental Analysis

VI. Decision

VII. Right of Appeal

Non-Rulemaking Decision Document
Lancer MOA, TX
(Airspace Case No. 00-ASW-01NR)

I. Summary: On April 18, the United States Air Force (USAF) requested that the Federal Aviation Administration (FAA) take action to establish the Lancer Military Operations Area (MOA) between Lubbock, TX and Abilene, TX. The Lancer MOA will be a part of a planned training initiative known as the Realistic Bombing Training Initiative (RBTI). The purpose of this initiative is to provide readiness training for USAF B-1 and B-52 aircrews in avoiding simulated threats and attacks. Specifically, the Lancer MOA will be used in conjunction with an instrument route (IR), ten electronic threat emitter sites, and two electronic scoring ranges to provide an interrelated and integrated set of training assets for training of B-1B and B-52H aircrews based at Dyess and Barksdale Air Force Bases.

II. Authority: The FAA Administrator has broad authority under Title 49 of the United States Code (49 U.S.C.) Section 40103 to regulate, control, develop plans for, and formulate policy with respect to the use of navigable airspace. Additionally, the Administrator has the authority to assign by rule, regulation, or order the use of navigable airspace of the United States under such terms, conditions, and limitations as deemed necessary in order to ensure the safety of aircraft and the efficient utilization of the navigable airspace. Also, under Section 40103, the agency is further authorized and directed to prescribe air traffic rules and regulations governing the efficient utilization of the navigable airspace. Further, in accordance with 49 U.S.C. Section 40101 the FAA shall consider the requirements of national defense, commercial and general aviation, and the public right of freedom of transit through the airspace.

III. Military Operations Areas:
A MOA is a type of special use airspace (SUA) established to separate/segregate certain non-hazardous military flight activities from aircraft operating in accordance with instrument flight rules (IFR). Additionally, MOAs are charted to assist non-participating aircraft operating in accordance with visual flight rules (VFR) in identifying these areas. When operating in these areas, military pilots are authorized by the FAA to exceed an indicated airspeed of 250 knots below 10,000 feet MSL. IFR operations may be routed through an active MOA when approved separation can be provided from the MOA activity. Otherwise, IFR operations will be rerouted to avoid the MOA. Procedures for use of the airspace by nonparticipating IFR traffic are set forth in letters of agreement between the facility having control jurisdiction over the MOA (the controlling agency) and the entity using the airspace (the using agency). VFR pilots are not restricted from flying in an active MOA, but are advised to exercise caution while doing so.

MOAs are not regulatory in nature and are established administratively. However, MOA proposals are circulated for public comment by the regional Air Traffic Division. MOA proposals are also subject to environmental impact analysis in accordance with the National Environmental Policy Act of 1969, and pertinent FAA and military service environmental directives. Approved MOAs are published in the National Flight Data

Digest for incorporation in the National Airspace System Database and aeronautical charts.

IV. Supplemental Information:

As previously mentioned, the USAF requests establishment of the Lancer MOA in an area (approximately 40nm by 80 NM) located between Lubbock, TX and Abilene, TX. Concurrent with the establishment of the Lancer MOA the Reese 4, Reese 5, and Roby MOAs will be revoked. The lateral limits of the Lancer MOA primarily lie within and occupy less area than the combined area of the three MOAs being revoked. The altitude of the Lancer MOA will be from 6,200 feet MSL up to but not including FL180. The MOA will be scheduled 0900-0000 local time, Monday-Friday and at other times by NOTAM. The controlling agency will be the Fort Worth Air Route Traffic Control Center and the using Agency will be U.S. Air Force, 7th Bomb Wing, Dyess AFB, TX

Locating the Lancer MOA within 600 miles of the Dyess and Barksdale Air Force Bases will permit aircrew members to train simultaneously as an integrated combat team. Currently, the 2nd and 7th Bomb Wings based at the Dyess and Barksdale Air Force Bases cannot achieve integrated, realistic training within a reasonable distance from the bases. Such training would require travel to northern Utah, Wyoming, South Dakota, or Montana.

Establishing the Lancer MOA will also enable aircrews to conduct multiple axis, simultaneous high and low altitude delivery tactics on different targets while being opposed by simulated air and surface threats. The training will utilize a variety of target acquisition methods including visual, radar, electro-optical guided weapons, and low altitude navigation targeting infrared for night typically. The MOA will be activated on a real-time basis for use by two to four aircraft operating at a time and certain areas and/or altitudes will be returned to the controlling agency when not required for military operations.

The public was provided an opportunity to comment on the proposal by means of a non-rulemaking circular issued on April 25, 2000. The comment period for this circular closed on June 27, 2000. At the request of Lubbock City officials, the proposal was re-circulated to fixed based operators (FBO) to provide pilots and operators the opportunity to comment on the proposal and the comment period was extended to July 7, 2000. Based on an analysis of the comments received, the FAA determined that informal airspace meetings were needed. Two informal airspace meetings were conducted on November 9, 2000 -- one at Lubbock and a second in Post Texas.

Comments received in response to the circular and informal airspace meetings pertained to communications, real-time access, the relatively large dimensions of the proposed airspace, and improved surveillance to provide IFR and VFR flight following to aircraft circumnavigating or flying through the lower altitudes of the proposed MOA. The FAA and USAF have agreed to take the following actions to mitigate these concerns:

Communications. Currently, the affected airspace is divided between four ARTCC sectors and two approach controls and there is no single frequency on which an aircraft can call (with any certainty) and contact the appropriate controlling sector, approach control, or the appropriate flight service station specialist. With military funding assistance, the FAA has agreed to construct a centrally located transmitter and receiver site near Snyder, TX. This will establish a single frequency for contacting an ARTCC sector that will be designated as a point of contact determining the status of the MOA. Additionally, the location of this communication site will allow the controlling sector to talk with aircraft at Snyder's municipal airport. The new contact frequency and the frequency for the appropriate flight service station will be published the Dallas-Ft. Worth Sectional Aeronautical Chart.

Real-time Access. In order to enhance flight planning and notification to the general aviation community, the U.S. Air Force has agreed to publish the schedule for the use of the MOA at least one day in advance. Additionally, the military facility at Snyder, which maintains scheduling, sequencing, and advisories to the aircraft using the MOA, will be available to assist in identifying available altitudes, disseminating changes to the use times, and answering other inquiries from the FAA to facilitate access to the MOA when the area is in use by the military.

Further real-time status information will be made available to the San Angelo and Fort Worth Flight Service Stations through a planned and newly developed Special Use Airspace/ Inflight Service Enhancement software program that integrates the scheduled activity and radar track information to display the activity in the MOA. Procedures are being developed regarding how to use the displayed information to better inform non-participating aircraft of the real-time status of the MOA airspace.

MOA Dimensions. The U.S. Air Force has agreed to amend the proposed floor of the MOA from 3,000 feet AGL to a single altitude of 6,200 feet above MSL to facilitate transit under the floor of the airspace by non-participating aircraft. Also, the FAA has initiated action to revise V-385 to clear the northeast corner of the proposed MOA. This action will facilitate the IFR circumnavigation of the MOA between Lubbock and Abilene. Additionally, because some aircraft may be on high altitude missions, and others may be able to complete lower altitude training and limit the remainder of their training to intermediate and higher altitudes, some altitudes may be released when not in use. This status information will be disseminated through the planned improvements to the availability of real-time status described above and will improve access to the MOA and reduce the impact of the relatively large size of the MOA.

Improved Surveillance. The FAA has determined that Fort Worth ARTCC's radar coverage extends below the proposed base of the Lancer MOA. However, in the event that the U.S. Air Force constructs a radar facility to support Realistic Bomber Training Initiatives, the FAA has agreed to use that radar information. The surveillance capabilities that exist now do not provide optimum service to non-participating aircraft because of limited communication capabilities at lower altitudes. The improvements in

communications will allow controllers to provide flight following and improved IFR services to non-participating aircraft transiting the area.

V. Environmental Analysis: The FAA has conducted an independent review of the USAF's Final Environmental Impact Statement and the December 2000 and August 2001 Environmental Assessments prepared for the RBTI, and has concluded that these documents are sufficient for adoption by the FAA pursuant to 40 C.F.R. § 1506(a) and (c). The FAA has carefully considered its goals and objectives in relation to the actions analyzed in the FEIS and the EAs. The FAA considered the purpose and need for the actions, alternative means of achieving the purpose and need, environmental impacts of the alternatives, and mitigation measures (see attachment).

VI. Decision: In consideration of the foregoing, the FAA approves the proposed Lancer MOA with an effective date of February 21, 2002.

VII. Right of Appeal:
This decision constitutes an order of the Administrator that is subject to review by the Courts of Appeal of the United States in accordance with the provisions of 49 U.S.C. § 46110.

R. C. Matthews

Reginald C. Matthews
Manager, Airspace & Rules Division

12/11/01
Date

Attachment

U.S. Department
of Transportation
Federal Aviation Administration

Memorandum

Subject: **ACTION:** Environmental Analysis, Realistic Bomber Training Initiative (RBTI) Airspace Proposal

Date: DEC - 6 2001

From: Acting Manager, Environmental Programs Division, ATA-300

Reply to Attn. of: Melissa Wishy

To: Manager, Airspace & Rules Division, ATA-400

Attached is the Agency's environmental analysis for the Realistic Bomber Training Initiative (RBTI) airspace proposal. Therefore, under the authority delegated to me by the Administrator of the FAA, I hereby adopt the Final Environmental Impact Statement (FEIS) and the December 2000 and August 2001 Environmental Assessment's (EA) and approve the requested non-rulemaking airspace modifications with an effective date of February 21, 2002.

The attached documentation can be used for inclusion into the Non-Rulemaking Decision Document (NRDD). Since the NRDD serves as the Agency's decision, the offices of ATA-300 and AGC-620 need to be coordinated with prior to the approval of the NRDD.

Ernestine Hunter

V. Environmental Review

a. Background:

This Non-Rulemaking Action was requested by the USAF as part of a larger USAF initiative called Realistic Bomber Training Initiative (RBTI). In addition to this Non-Rulemaking Action to establish the Lancer Military Operations Area (MOA), the RBTI also includes the following components:

(1) Revision to Military Training Route IR-178
(2) Construction of two electronic scoring sites
(3) Construction of ten emitter sites (five for the Lancer MOA and five along IR-178)
(4) Closure of the electronic scoring sites at Harrison, Arkansas and La Junta, Colorado.
(5) Creating an Air Traffic Controlled Assigned Airspace (ATCAA) above the Lancer MOA extending to 40,000 feet Mean Sea Level (MSL).

Pursuant to Section 102(2) of the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations implementing NEPA (40 C.F.R. Parts 1500-1508), and other applicable law, the USAF prepared and published a Final Environmental Impact Statement (FEIS) that analyzed the potential environmental impacts associated with the RBTI. The FEIS considered four alternatives: the No-Action alternative continuing with no change in airspace and assets, the IR-178/Lancer MOA alternative revising the military training route and establishing the Lancer MOA, the IR-178/Texon MOA alternative revising the military training route and revising the Texon MOA, and the IR-153/Mt Dora MOA alternative revising the military training route and revising the Mt Dora MOA. The three "action alternatives" analyzed in the FEIS all included construction of two electronic scoring sites and ten emitter sites, but the location of these sites differed between the alternatives.

The USAF issued a Record of Decision (ROD) for the RBTI in March 2000. In the ROD, the USAF selected the IR-178/Lancer MOA alternative as the environmentally and operationally preferred alternative.

After the USAF issued its ROD, the two electronic scoring sites and two of the emitter sites the USAF had selected became unavailable. The USAF prepared an Environmental Assessment (EA) and issued a Finding of No Significant Impact (FONSI), both dated December 2000, for the replacement of these four sites.

After the USAF issued the December 2000 FONSI, six additional emitter sites the USAF had selected in its March 2000 ROD became unavailable. The USAF prepared an additional EA and FONSI, dated August 2001, for the replacement of these sites.

b. Environmental Impacts:

The potential environmental impacts associated with the IR-178/Lancer MOA alternative include the following:

Noise

Flight activity within the Lancer MOA would be restricted to above 3,000 feet Above Ground Level (AGL). The 8 to 10 average aircraft sorties per day would generate a cumulative noise level of approximately DNL 46 dB. The significant impact threshold in FAA Order 1050.1D, Chg 4, Att. 2, paragraph 13, is an increase within the DNL 65 dB contour of DNL 1.5 dB or greater on any noise sensitive area; therefore, aircraft operating within the Lancer would not be expected to create a significant noise impact.

Noise levels on IR-178 would range from DNL 46 dB to DNL 62 dB, with the highest noise occurring near the starting segment of the route where the numbers of aircraft operations would be the greatest. The anticipated noise increase along the route ranges from DNL 2 dB to DNL 13 dB, depending on the route segment. Aircraft noise would decrease in four route segments.

Land Use

Historically, the affected airspace under RBTI accommodated aircraft overflights, including military flight training activities and civil aviation. The RBTI study area extends into the Trans-Pecos or Big Bend Country in extreme west Texas through the Llano Estacoado and Edwards Plateau Regions in North Central Texas. Typically the area represents broad desert flats separated by scattered mountain ranges to the irrigated farmlands south of Lubbock. Ranching, oil exploration and development, hunting, and farming are the primary land uses associated with the areas under the proposed IR-178/Lancer MOA airspace. The proposed changes to IR-178 would reduce the land area under the airspace by about 2,300 square nautical miles, while the proposed Lancer MOA would increase the land area under airspace by about 300 square nautical miles. About 15% of the proposed IR-78 would be new airspace. As stated above, the highest noise level under the IR-178/Lancer MOA airspace would be DNL 62 dB, below the DNL 65 dB compatibility criterion in FAA Order 1050.1D, Chg 4, Att. 2, paragraph 3.

Some concern was expressed by the public regarding the effects of aircraft overflights on domestic livestock, including cattle, horses, and bison. As discussed in the FEIS at page 4-99, several general conclusions can be drawn from numerous studies on this subject: (1) overflights do not increase death rates and abortion rates, or reduce productivity rates (e.g., birth rates and weights), and do not lower milk production among domestic livestock; (2) animals take care not to damage themselves and do not run into obstructions, unless confined or traversing dangerous ground at a high rate if overflown by aircraft at 50 to 100 meters AGL; and (3) domestic livestock habituate to overflights and other noise; although they may look or startle at a sudden onset of aircraft noise, they resume normal behavior within 2 minutes after the disturbance.

Portions of two state-owned special use land management areas (Chinati Mountains Property and Big Bend Ranch State Park) underlie the IR-178 airspace. The portions of these areas underlying IR-178 would experience noise levels of DNL 60 to 61 dB, about

2 to 3 dB greater than existing conditions. The Chinati Mountains Property is not open to the public for use at this time. Future public recreational activities and wildlife management planned for the area should be compatible with 2 to 3 dB increases in noise at these cumulative noise levels. The largely traditional recreational activities in Big Bend Ranch State Park, camping, boating, and picnics would also be compatible under FAA land use compatible guidelines. A 2 to 3 dB increase in noise could be noticeable at noise levels below DNL 65 dB, but should not interfere with wildlife viewing. There are no potentially significant adverse biological impacts, as discussed below.

Cultural Resources

The RBTI EIS identifies 15 National Register-listed properties under the proposed IR-178/Lancer MOA airspace, all of which are currently overflown by the military. No National Historic Landmarks are located within 20 miles of the affected airspace. There are no Native American pueblos or reservations underneath IR-178 or the Lancer MOA. No traditional cultural properties have been identified under the affected airspace.

The FEIS states that the USAF inspected 16 emitter and scoring site locations associated with the IR-178/Lancer MOA alternative for cultural resources.In a letter dated January 5, 2000, the State Historic Preservation Officer (SHPO) for the state of Texas concurred with the USAF's determination that the proposed electronic scoring sites and emitter sites analyzed in the EIS would have no effect on historic properties within the State of Texas. The SHPO conditioned this concurrence on the USAF avoiding two sites and consulting with the SHPO regarding any future construction and improvements of access roads to the sites.

In a letter dated May 3, 2001, the SHPO concurred with the USAF's determination of "no historic properties affected" for the replacement sites covered by the December 2000 EA. By letter dated October 23, 2001, the SHPO provided a similar concurrence for the additional replacement sites covered by the August 2001 EA. The SHPO conditioned this concurrence on the USAF clearly marking the sites to avoid inadvertent damage during construction, and consulting with the SHPO regarding any future construction and improvements of access roads to the sites. Also on October 23, 2001, the SHPO concurred that the airspace modifications in the RBTI undertaking would have no adverse affect on historic properties.

Threatened and Endangered Species

Biological surveys of the emitter and electronic scoring sites analyzed in the FEIS revealed no water-dependent species and no critical habitat for water-dependent species. No Federally listed threatened or endangered species nor potential habitat were observed during biological surveys. Two factors indicate that construction of these sites would not result in significant impacts to sensitive species:

(1) The amount of affected habitat is negligible compared to the total habitat available within the region; and

(2) The candidate sites have been subject to varying degrees of previous disturbance (e.g. agriculture, grazing, oil and gas development) that has altered habitat.

For the two emitter sites and two electronic scoring sites analyzed in the December 2000 EA, data on threatened, endangered, and sensitive species were obtained through informal consultation with the U.S. Fish and Wildlife Service (USFWS). USAF biological surveys of these sites revealed no evidence of rare plants or habitat likely to support these species.

Biological surveys of six of the seven replacement emitter sites analyzed in the August 2001 EA revealed no rare plants or habitat likely to support these species due to previous disturbance. The seventh site (Nine Point (South)) contains minimally disturbed habitat that could be suitable to support several sensitive plant species, although none were observed on site. The USAF did not select the Nine Point (South) site as an RBTI electronic scoring site.

The USAF determined that the IR-178/Lancer MOA alternative would not affect listed species or critical habitat, and therefore did not require consultation with the USFWS under Section 7 of the Endangered Species Act.

c. Mitigation:

The alternatives considered in the FEIS were designed to avoid and minimize environmental impacts. In addition, the USAF adopted numerous mitigation measures in its ROD to "reduce the potential for particular effects to resources, as identified in the EIS."

VI. Conclusion and Decision

The FAA reviewed all comments in response to the circularization of the proposal and has determined that there is a valid training requirement for the establishment of the Lancer MOA and the subsequent removal of the Reese 4, Reese 5, and Roby MOAs in support of the Realistic Bomber Training Initiative.

Approval of the requested airspace actions will result in an increase in Special Use Airspace (SUA.) About 15 percent of proposed IR-178 would be new airspace. Although the Lancer MOAwould incorporate most of the airspace in the existing Reese 4, Reese 5, and Roby MOAs, roughly 10 percent of the horizontal area of the proposed Lancer MOA would be new airspace. In addition, the floor of Lancer MOA would extend down to approximately 3,000 feet AGL, about 3,000 to 6,000 feet lower than the floor altitudes of the existing MOAs.

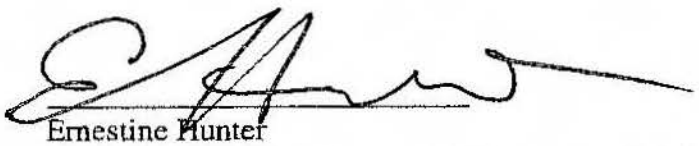
In consideration of the foregoing, the FAA has determined that the establishment of the Lancer MOA, as requested by the USAF, is necessary in the interest of national defense.

The FAA has conducted an independent review of the FEIS and the subsequent EAs the USAF prepared for the RBTI, and has concluded that these documents are sufficient for adoption by the FAA pursuant to 40 C.F.R. § 1506(a) and (c). The FAA has carefully considered its goals and objectives in relation to the actions analyzed in the FEIS and the EAs. The FAA considered the purpose and need for the actions, alternative means of achieving the purpose and need, environmental impacts of the alternatives, and mitigation measures.

Therefore, under the authority delegated to me by the Administrator of the FAA, I hereby adopt the FEIS and the December 2000 and August 2001 EAs and approve the requested non-rulemaking airspace modifications with an effective date of February 21, 2002.

VII. Right of Appeal:

This decision is made pursuant to 49 U.S.C. Subtitle VII, Part A, and constitutes an order of the Administrator that is subject to review by the Courts of Appeal of the United States in accordance with the provisions of 49 U.S.C. § 46110.



Ernestine Hunter
Acting Manager, Environmental Programs Division, ATA-300

APPENDIX C

RBTI AIRSPACE PROPOSAL DOCUMENTS

LIST OF AIR FORCE DOCUMENTS IN APPENDIX C

HQ ACC RBTI Airspace Proposal, letter dated April 10, 2000
with the following attachments:

- Dyess AFB, TX, RBTI Airspace Proposal Transmittal Letter, Undated
- Airspace Proposal (Lancer MOA)

10 April 2000

MEMORANDUM FOR AFREP, FAA SOUTHWEST REGION

FROM: HQ ACC/XORA
205 Dodd Blvd Ste 101
Langley AFB VA 23665-2789

SUBJECT: Realistic Bomber Training Initiative (RBTI) Airspace Proposal

1. The attached RBTI proposal is for your review and further processing. It is a nonrule making action that consolidates three existing military operations areas (MOAs), Reese 4, Reese 5 and Roby, into a single MOA (Lancer).

2. The environmental action for this proposal is entitled *Realistic Bomber Training Initiative* dated January 2000. It was completed on 24 Mar 00 when the Record of Decision was signed (Attachment 2). The entire environmental document is available at the web site http://www.cevp.com.

3. Point of contact for this action is Mr Kent Apple, XORA, DSN 574-7552.

COPY

GERALD D. GARRETT, GS-14
Chief, Airspace Operations Team

Attachments:
1. RBTI MOA proposal, w/chart
2. RBTI Record of Decision

cc:
7 OSS/OSTA

MEMORANDUM FOR ACC/XOR

FROM: 7 OG/CC
618 Second Street, Ste 110
Dyess AFB TX 79607-1918

SUBJECT: Airspace Proposal for LANCER MOA

After careful consideration and review, the attached Airspace Proposal is the 7 BW recommendation for the proposed LANCER MOA.

//SIGNED//
TIMOTHY W. VAN SPLUNDER, Col, USAF
Commander

AIR COMBAT COMMAND MILITARY OPERATIONS AREAS (MOA)
REALISTIC BOMBER TRAINING INITIATIVE

The following non-rulemaking special use airspace proposal is submitted in accordance with FAA Handbook 7400.2D, *Procedures for Handling Airspace Matters.*

27-30. DESCRIPTION

a. TITLE — Proposed Lancer MOA, to replace the existing Reese Four MOA, Reese Five MOA and Roby MOA.

b. BOUNDARIES: Lateral boundary beginning at:

33-16'00"N 101-53'00"W to
33-16'00"N 100-33'00"W to
32-58'00"N 100-20'00"W to
32-33'00"N 100-23'00"W to
32-35'00"N 101-57'00"W to the point of beginning:

c: ALTITUDES: Vertical dimensions will be 3,000 feet AGL to, but not including, FL180.

d. TIMES OF USE: From 0900-0000 local time, Monday through Friday; other times by NOTAM.

e. CONTROLLING AGENCY: Fort Worth Air Route Traffic Control Center (ARTCC), 13800 FAA Road, Fort Worth 76039.

f. USING AGENCY: U. S. Air Force, 7th Bomb Wing, Dyess AFB, Texas.

27-31. COORDINATION

a. Fort Worth ARTCC: The draft airspace proposal was presented as part of an overall Realistic Bomber Training Initiative project meeting held on 24 Mar 99 with a follow on meeting on 8 Jun 99 at the Southwest Region. Fort Worth ARTCC was represented and conducted an aeronautical study (attached). Boundaries of the proposed airspace were changed as a result of Fort Worth ARTCC's recommendations.

b. State of Texas: Coordination was accomplished directly with the Governor's office through various briefings and meetings between state officials and senior Air Force leadership.

27-32. JUSTIFICATION

a. The United States Air Force proposes to develop an interrelated, complimentary and flexible set of training assets within 600 miles of Dyess AFB TX and Barksdale AFB LA to provide quality bomber aircrew training. These training assets would include an Instrument Route (IR), a MOA, ten emitter sites and two electronic scoring sites. This action is named the Realistic Bomber Training Initiative (RBTI).

b. The proposed action would ensure the combat readiness of aircrews assigned to Dyess and Barksdale AFBs. RBTI proposes to place training assets, located in sufficient proximity to both bases, to routinely allow realistic training missions to be flown while reducing non-productive transit time. RBTI would also permit all aircrew members to train simultaneously as a combat team; know as integrated training. This project would provide three key objectives:

- Provide realistic, integrated training using interrelated training assets that offer terrain and airspace simulating the variety of conditions anticipated for combat missions for B-1B and B-52H aircrews at Dyess and Barksdale AFBs.
- Offer these realistic, interrelated training assets in close proximity to Barksdale and Dyess AFB's.
- Permit flexibility and variability in training that supports both the similarities and differences in training for B-1B and B-52H aircrews as well as simulating the variable conditions inherent in worldwide combat.

c. At present, the 2nd and 7th Bomb Wings cannot achieve realistic, integrated training using interrelated assets that are readily accessible to either base. Rather, aircrews from these wings must either fly to northern Utah, Wyoming, South Dakota, or Montana where suitable integrated training assets are available, or use closer facilities that fail to provide integrated training opportunities.

d. A MOA, to meet the requirements of RBTI, would need the following:

- Be 80 nautical miles by 40 nautical miles in size
- Have a floor no higher than 3,000 feet above ground level
- Be readily accessible from a suitable IR military training route
- Overlay lands that permit placement of electronic emitters

27-33. ACTIVITIES

a. Activities to be conducted by all participating units may include, but are not necessarily limited to:

- Advanced handling characteristics
- Air combat training (including dissimilar air combat maneuvers and dissimilar air combat tactics)

- Intercept
- Air combat tactics
- Air combat maneuvers (including defensive and offensive maneuvering)
- Electronic countermeasures (including simulated suppression of enemy air defenses)
- Tactical formation
- Tactical navigation
- Threat awareness and defensive tactics

b. Daily operations normally are scheduled to begin at 0900 local time and end at 0000 local time. Operations will be conducted under VFR and IFR.

c. The area will be used approximately fifteen hours daily.

d. The area will be used daily (Monday through Friday) throughout the year. Weekend use (by NOTAM) for Air National Guard units or special exercises would be expected infrequently.

e. Aircraft Operations:

(1) The numbers and type of aircraft:

AIRCRAFT	SORTIES
B-1B	1850
B-52H	400
B-2	50
Other (Fighter type)	50
TOTAL	2350

(2) Ground and airborne radar will not normally be available.

(3) All altitudes requested will normally be used in daily operations. 80% of the B-1B sorties and 85% of the B-52H sorties will be day sorties within charted times. 20% of the B-1B sorties and 15% of the B-52H sorties will be night (after 2200L).

(4) Supersonic speeds are not planned for this airspace.

f. The area will not be used for surface firing.

27-34. SAFETY CONSIDERATIONS

a. Navaids, visual ground references, avionics, ground and airborne radar will be used to remain within the airspace boundaries.

b. In-flight emergencies and malfunctions will be handled IAW flight manuals, appropriate flight regulations, FARs and LOAs.

c. Training ordnance will not be used in this airspace.

27-35. COMMUNICATIONS AND RADAR

A military radar unit (MRU) is planned for this airspace. Airborne communications will be available through the electronic scoring site and MRU.

27-36. ENVIRONMENTAL AND LAND USE INFORMATION

a. The Lead Agency responsible for compliance with NEPA will be HQ ACC/XOR, POC is Col Lynn Wheeless, Air Combat Command Ranges, Airspace and Airfields Division, 205 Dodd Blvd, Ste 101, Langley AFB VA 23665-2789 telephone (757) 764-4661 or DSN 574-4661.

b. NEPA compliance for this project was completed with the issuance of a record of decision dated 24 Mar 00. HQ ACC/CEV, Air Combat Command Environmental Compliance, will maintain the environmental certification on file.

c. Persons wishing to make comments on environmental or land use aspects of this project may submit them to the 7th Bomb Wing Public Affairs Office, 650 2nd Street, Dyess AFB TX 79607-1960 telephone (915) 696-2863 or fax (915) 696-2052.

d. The minimum floor for this proposal is 3,000 feet above ground level, therefore, aerial access to public and private airports beneath the area will not be restricted.

27-37. GRAPHIC DISPLAY (see attached)

a. Aircraft flight patterns/Impact areas: N/A.

b. Surface firing data: N/A.

27-38. JOINT USE

The area will be joint-use with Fort Worth ARTCC designated as the controlling agency.

APPENDIX D

OJARS SKUJINS' COURT DECLARATION ON VORTICES

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF TEXAS
LUBBOCK DIVISION

DAVIS MOUNTAINS TRANS-PECOS HERITAGE ASSOCIATION, et. al.	§	
Plaintiffs,	§	
v.	§	Case No. 5:01-CV-289-C
UNITED STATES AIR FORCE, et. al.	§	**DECLARATION OF OJARS SKUJINS, Ph.D.**
Defendants	§	

I, Ojars Skujins, declare pursuant to 28 U.S.C. § 1746 as follows:

1. I am Ojars Skujins, Chief of the Flight Mechanics Branch, Engineering Directorate, Aeronautical Systems Center at Wright-Patterson Air Force Base, Ohio. The Flight Mechanics Branch provides technical expertise to all of the USAF customers in addition to the Air Force Aeronautical Systems Center in the application engineering areas of aerodynamics (both external and internal/propulsion installation), flight performance, flight stability & control, flying qualities, flight controls, and vehicle management systems.

2. I earned my B.S., M.S., and Ph.D. (1973) degrees in Aerospace Engineering from West Virginia University. After four years as an engineer on active duty with the Air Force, I left active duty and continued my government career as a civilian engineer at Wright-Patterson Air Force Base, Ohio, specializing in aerospace engineering analysis with emphasis in applying computational fluid dynamics methodologies to solve warfighter problems. During my 29-year tenure with the Air Force, I have gained vast

experience in experimental testing, including wind tunnel and flight test programs for the F-16, B-2, PAVE Tiger, Tacit Rainbow, F-4, and other weapon systems. I have been involved in the development of most weapon systems in the Air Force inventory, from small remotely piloted vehicles to the B-2 bomber. I was the Flight Technology Lead Engineer for the B-2 bomber program and had the government responsibility for leading the flight technology disciplines (aerodynamics, flight controls, flying qualities, air vehicle performance, and computer resources) through design development, flight test, and on to operational service. More recently I was the Chief Flight Systems Engineer for the F-15 Program office and the F-15S Saudi Program. I also served on the DoD Blue Ribbon Panel investigating F/A-18E/F wing drop issues.

3. With regard to *Davis Mountains, et al. vs. USAF,* I was asked by the Air Force to join a team of experts from the Engineering Directorate of the Aeronautical Systems Center and the B-1B System Program office at Wright-Patterson AFB to review the Air Force's Final Environmental Impact Statement (EIS), dated January 2000, for the Realistic Bomber Training Initiative (RBTI) at Dyess and Barksdale Air Force Bases. We also reviewed the declaration of Dr. Ronald Stearman and relevant portions of the administrative record.

4. The EIS, which focused on the B-52, indicated that a flight at 300 feet would generate a surface breeze of less than 4 mph. This conclusion is validated by our analysis that indicates the induced wind speed at the surface would be approximately 3 mph. The EIS also correctly concludes that B-1Bs generate similar low wind speeds at ground level. Models we ran in response to Dr. Stearman's comments indicate a B-1 under typical operating conditions (500 feet, .85 Mach, and 300k lbs, aft wing sweep) would generate a maximum wind speed of approximately 10 mph at the surface. (Figure 1.)

5. Dr. Stearman focuses his comments on the assertion that the B-1B vortex characteristic data contained in administrative record is flawed insomuch as it relies on the Prandtl lifting line theory to quantify the impact of wingtip vortex strength at ground level due to B-1B aircraft overflights. Dr. Stearman asserts that the Prandtl theory is not a valid model for the B-1 bomber wing. This assertion, fundamental to his arguments, is incorrect. The basic Prandtl theory is, in fact, applicable to the B-1B, although the chart contained within the administrative record is oversimplified in that it did not take into account time dependent effects. As a result of the oversimplification, the chart does tend to underestimate the maximum vortex strength. My team of experts, therefore, has recently reexamined the B-1B vortex wake issue and has quantified the impact of wingtip vortex strength at ground level due to B-1B overflights. Our analysis has determined that while actual induced wind speed will be greater than those expressed in the chart contained within the administrative record, the induced wind speed at the surface will be only about 10 mph. (Figure 1.) Therefore, the discussion and conclusion within the EIS remain unaffected: wake turbulence would not be expected to affect the safety of people, vehicles, or structures.

6. As described in the EIS, as an aircraft moves through the air the wings generate vortices. The vortices collectively are often referred to as wake turbulence. As the aircraft moves forward, the vortices trail behind the aircraft and sink towards the earth. The maximum velocities occur near the center of a vortex and the velocities decrease further away from the center. As they sink the maximum velocities near the center decrease, and the vortices tend to completely break up after approximately one to three minutes. The center of the vortex, descends only to a minimum height above the ground. The minimum height, below which the vortex center will not descend, is related to the span of the aircraft wing. For example, the core of the vortex generated by a B-52

under normal conditions will not descend below 66 feet. For B-1B aircraft, the height above the ground of the maximum vortex is a function of wing sweep (Figure 3)

7. Our expert team based its recent analysis on the report AFFDL-TR-79-3060, "A Method for Assessing the Impact of Wake Vortices on USAF Operations," July 1979 by G. Kurylowich (Attachment 1), which provides the equations necessary to address the effects of wing tip vortices near the ground. This report is the result of a multi-year study performed by the USAF on aircraft wake vortices. The associated methodology in this report accounts for time dependent vortex effects. Our analysis of wingtip vortex strength has produced the following results:

a. The scenarios presented in the EIS for the B-52 (or a B-1B with a forward wing sweep) do not differ significantly from the conclusions reached by my team. The B-52 would generate wind velocities of less than 5 mph near the ground. The induced velocity at the ground for the B-52 (at Mach 0.6, weight 450,000 lbs, altitude 300' above ground level (AGL)) is approximately 3 mph. A B-1B under typical training flight operating conditions (500 ft above ground, 300k lb., Mach 0.85) generates maximum vortex velocity of 10 mph at the ground. (Figure 1.) If that same B-1B is at the minimum altitude permitted on the training route (300 feet AGL), the maximum velocity at the surface would be approximately the same, 10 mph for typical training flight conditions (.85 Mach, 300k lbs). (Figure 1.)

b. To determine effects on tall structures, we examined maximum wake vortex strength and the height above the ground at which it would occur under typical operating conditions for RBTI B-1B training flights. (Figure 2.) Because of the wing span of a B-52, a wing vortex would not be expected to descend below 66 feet above the surface, above most structures in rural areas. A conservative estimate would be that a B-52 would generate a maximum velocity near the core of only 27 mph at 66 feet above the ground.

Because of the swept wing configuration of the B-1B, wing vortices descend closer to the ground than in the case of a B-52. (Figures 3 and 4.) Under typical operating conditions described above (500 feet, .85 Mach, and 300k lbs, aft wing sweep) the maximum velocity near the core would be 22 mph at 19 feet off the ground. (Figure 1 and Figure 2.)

c. We also ran tests to determine the worst case scenario. The worst case scenario would occur if a B-1B were to fly at the slower speed of .7 Mach, with a full aft wing sweep, and fully loaded. (Figures 1 and 2.) If a B-1B in such a configuration were to over fly a structure at 300 feet AGL, it would generate a 14 mph vortex at ground level. (Figure 1.) At 22 feet above the ground, the worst case scenario is expected to produce a vortex strength of 47 mph. (Figure 1 and 2.) Given that the FAA requires an aircraft to over fly all structures by 500 feet, under the worse case scenario the maximum vortex strength would be reduced to 33 mph at approximately 20 feet above the ground and the surface wind would be approximately 14 mph. (Figure 1.)

8. The likelihood of a particular structure being damaged by a wingtip vortex is extremely remote because a vortex even directly interacting with a ground structure does not have sufficient strength for even a direct over-flight to adversely affect a structure beneath the aircraft. The vortex, of course, will remain near the ground and travel laterally for a short time, but the maximum velocity will be continually decreasing even before breakdown. FAA rules require avoiding structures by 500 feet laterally or vertically. As described above, compliance with this rule ensures that a vortex generated even under the worst case scenario would be greatly reduced. Additionally, wing vortex strength generated by the model is conservative, the strength in real life would tend to be less. Ground clutter and atmospheric conditions, including wind gusts will lessen the effect of wingtip vortices, causing faster dissipation.

9. As the EIS states, naturally occurring winds in West Texas would tend to be greater than wind generated by low-flying aircraft. The EIS states that average daily wind speeds exceed winds expected to be generated by wake turbulence, and this is borne out by the analysis set out above. According to the documents I was provided from the administrative record, the average daily wind speed for Midland, Texas is 11.1 mph and 12.4 mph for Lubbock. This exceeds the surface speed expected to be generated by low flying aircraft in all but the worst case scenario where the average wind speed would be exceeded by less than 3 mph. Because wake turbulence is comparable to a wind gust, we analyzed data from the National Oceanic and Atmospheric Administration (NOAA). (Tables 1.) Using five years of peak gust data for Midland and Lubbock, Texas we were able to make some observations. Nearly every day in West Texas sees a gust in excess of 14 mph, which is the worst-case scenario for surface winds generated by RBTI aircraft. (Tables 1.) On close to 80 percent of the days, a wind gust of 22 mph or greater occurs. (Tables 1.) This is equal or greater than the maximum vortex strength near the core that would be expected to occur under typical RBTI training profiles. (Table 1.) On between 2.6% and 3.3% of the days (approximately 9-12 times per year), naturally occurring wind gusts exceed 47 mph, which is the worst case scenario with a B-1B over flying a structure at 300 feet AGL. (Tables 1.)

10. Dr. Stearman devotes a great deal of his declaration to the topic of embedded supersonic regions. This concept was not considered in the USAF analysis because it is irrelevant to the issue at hand. Most supersonic regions in transonic flight occur locally over the wing and fuselage. The B-1B does not fly fast enough during its training missions to produce a *concentrated* shock wave emanating from the aircraft (resulting in a significant pressure wave with the ground), which is the only supersonic phenomenon

considered to propagate long distances. The velocity within the vortex core is actually inversely proportional to the aircraft's forward velocity. Given everything else constant (e.g. weight, altitude, wing sweep, etc.), the faster an aircraft goes, the weaker will be the wing vortices due to lift. This is the reason the Mach 0.7 case was chosen (representing the worst case) in the sample calculations, instead of the maximum speed or even the standard training mission speed for the B-1B. Transonic flight does not equate to transonic vortex flow velocities. Additionally, not only do Air Force regulations prohibit supersonic flight; the technical orders place a structural limitation on the B-1B prohibiting flight above .95 Mach below 5000 ft MSL.

11. In response to other assertions in Dr Stearman's declaration, I offer the following information:

a. Regarding paragraphs 11 and 12 of the Stearman Declaration: It is true that a leading edge vortex will occur in certain flight conditions for the B-1B, but these vortices will tend to *increase* the rate of breakup of the main vortices. The assumption used in the original USAF analysis that all lift is concentrated into one vortex pair is actually conservative. The wing glove vortex structure becomes stronger (but short lived), during maneuvering flight, but it generally will break up within a short distance aft of the aircraft. A large aircraft such as the B-1B will not be exercising high energy maneuvers at 300 to 500 feet above ground level (AGL) at transonic speeds during training scenarios.

b. Regarding paragraphs 14 through 19 of the Stearman Declaration: The B-1B will create an aerodynamic disturbance through the air, much as an automobile will affect the air traveling down a highway. Local shocks can emanate from the aircraft (visualized

by the "condensation regions" reported in the Declaration), but will have insignificant delta pressure effects beyond approximately one wingspan length below the aircraft. Sound levels generated by a weapon system *are not applicable* to vortex strength analysis.

c. Regarding paragraph 21 and 22 of the Stearman Declaration: Based on the diagram of a 747 with an engine incomparable to that of a B-1, Dr. Stearman suggests a jet blast could create a disturbance on the ground. Even figures 8 and 9 in his declaration indicate the plume from the jet blast does not spread very far from the engine axis. For a B-1B the spread would be even less due to the high by-pass nature of the 747 engines as compared to military engines. The turbulent effects of jet blast from a B-1B will not be felt on the ground 300 feet below.

d. Regarding paragraph 22 through 24 of the Stearman Declaration: Dr. Stearman makes the statement that velocities in the range of 35 - 50 mph could be damaging to windmills. Only the worst-case scenario whereby a B-1B is within FAA minimum avoidance distances would generate a maximum vortex in this range as described above. Naturally occurring peak wind gusts in this region exceed 35 mph between 17% and 21% of all days. Naturally occurring wind gusts in excess of 47 mph would be expected between 9-12 times annually. (Table 1.) Dr. Stearmans' conclusion that Mr. Young's windmill suffered damage from over flights does not appear to be well supported.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 12 December 2002.

Ojars Skujins, Ph.D
Chief, Flight Mechanics Branch
Aeronautical Systems Center
Engineering Directorate
Wright-Patterson AFB, OH

Figure 1: Lateral Velocity of a Vortex Generated by a B-1B

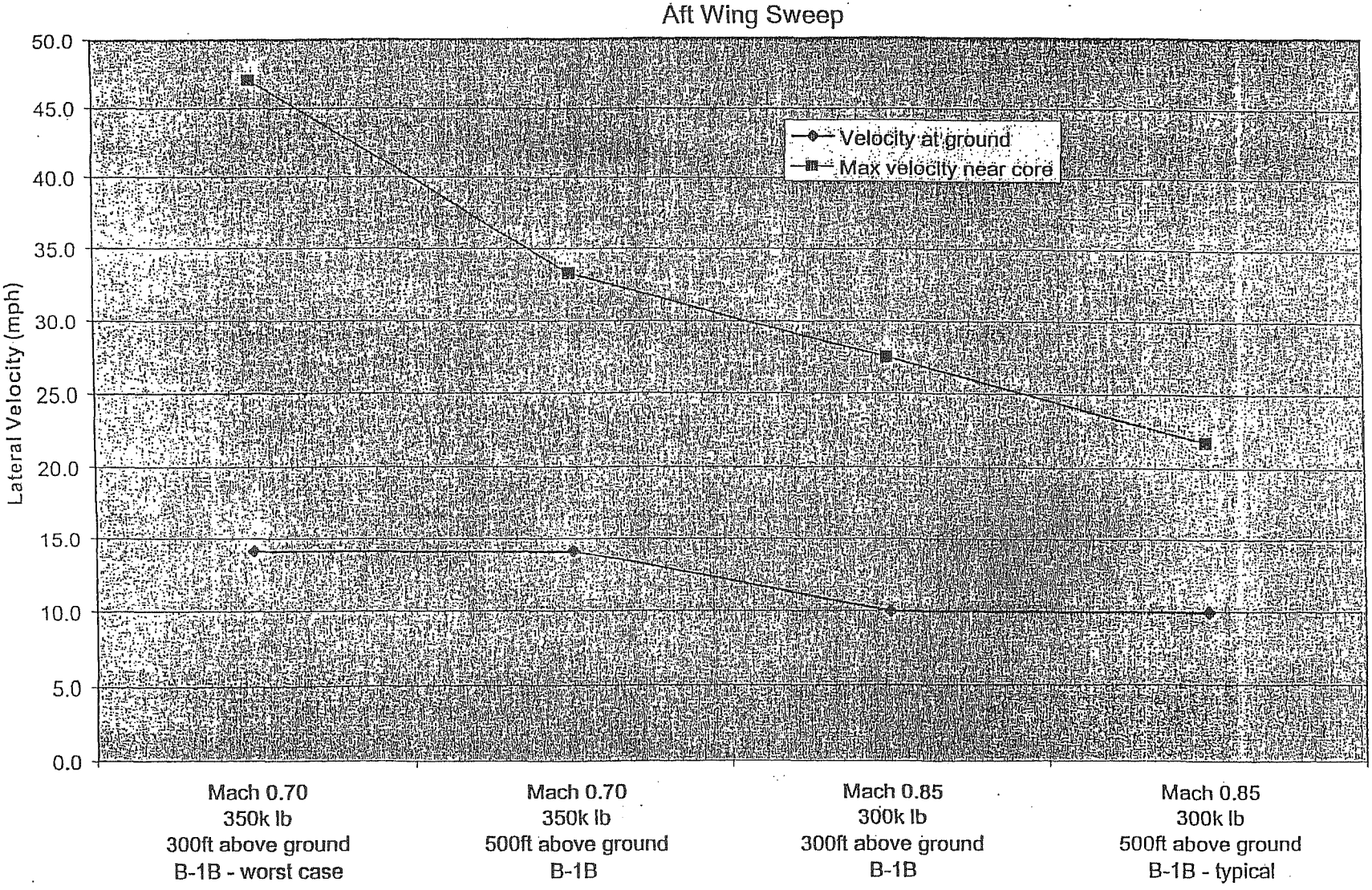


Figure 2: Height Above Ground for Max Velocity of a Vortex Generated by a B-1B

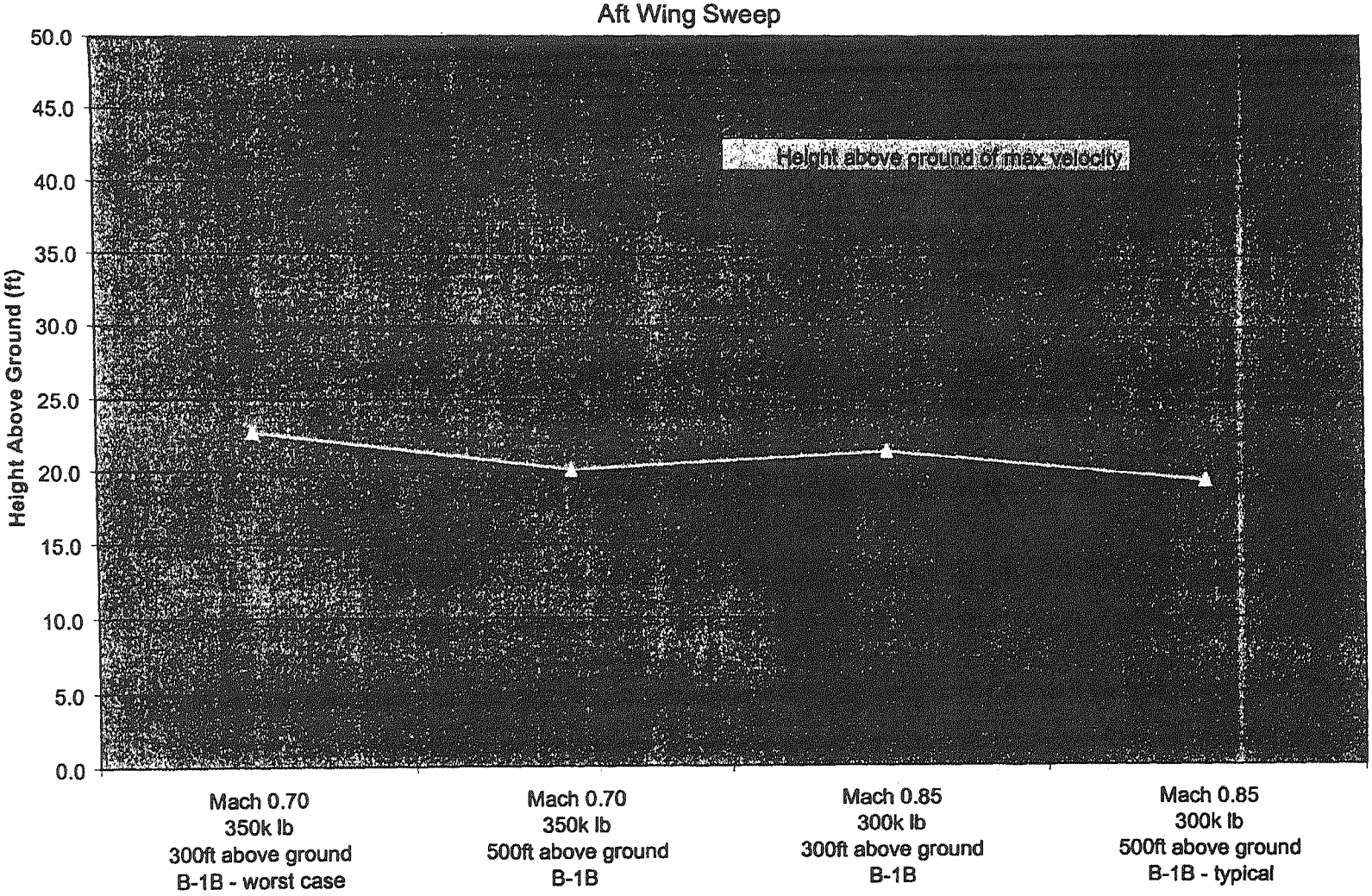


Figure 3: Lateral velocity of a Vortex generated by a B-1B - Wing Sweep Effects

For 300 ft AGL, 2000 ft. alt, Mach 0.70, 350k lbs.

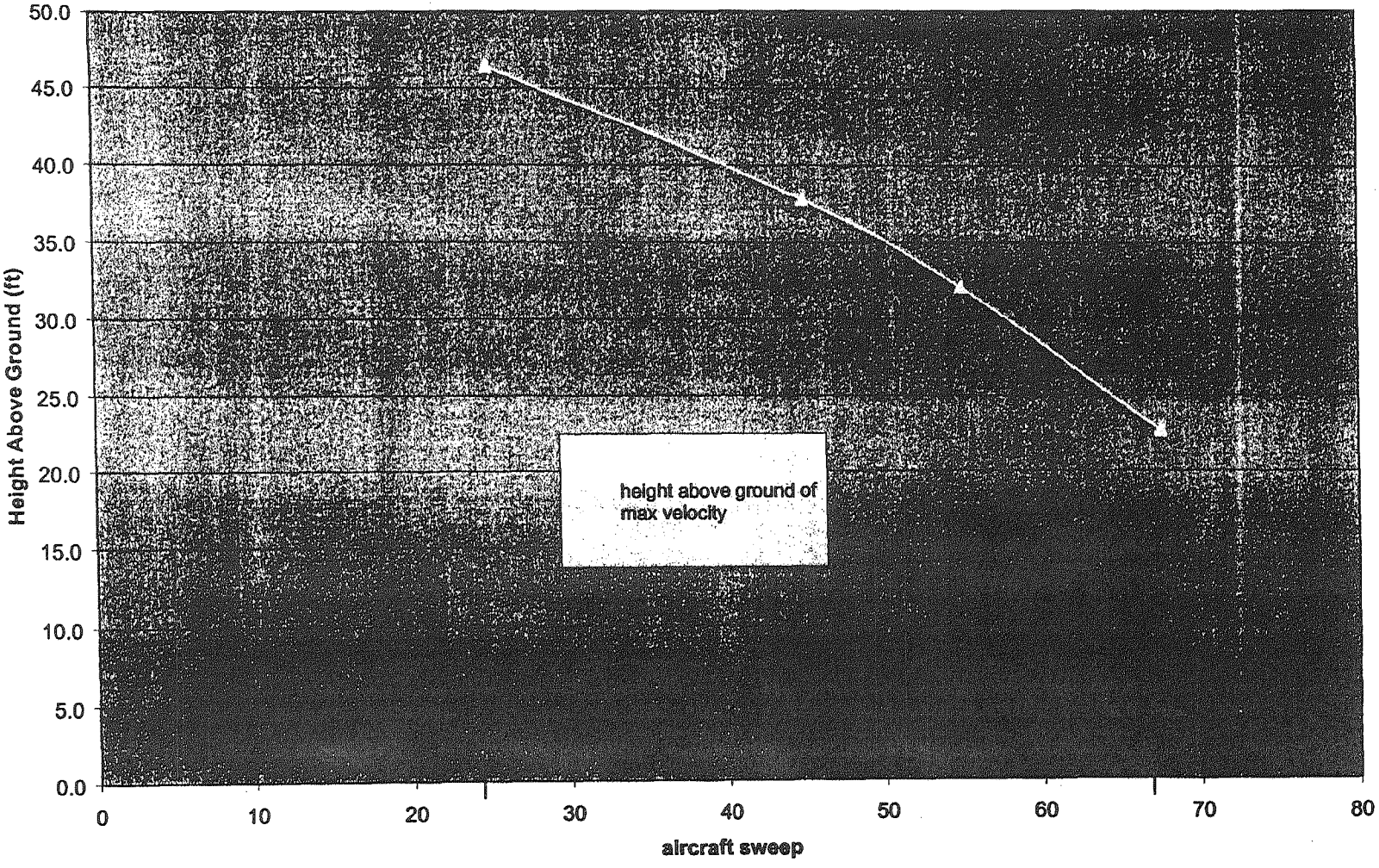
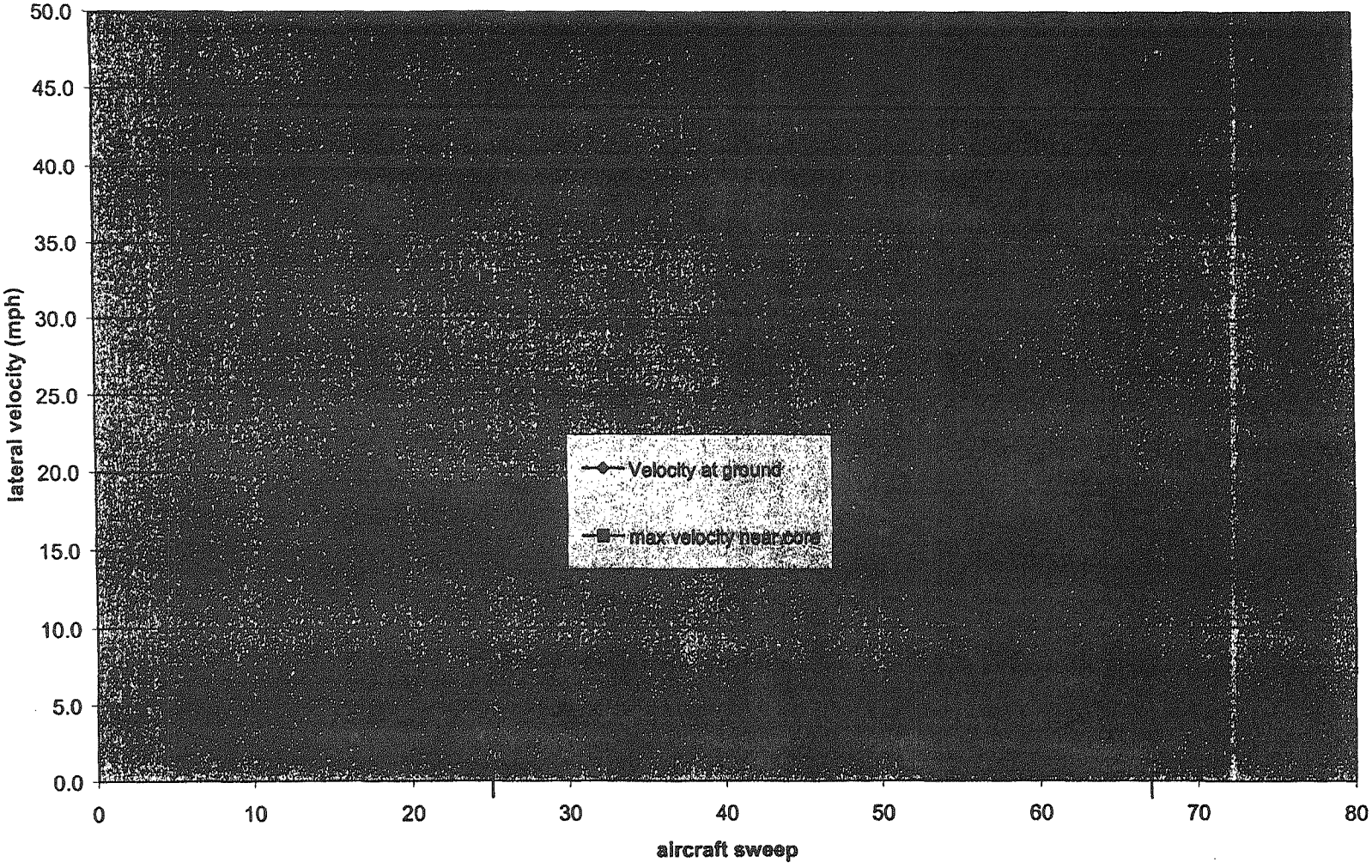


Figure 4: Lateral velocity of a Vortex generated by a B-1B - Wing Sweep Effects

For 300 ft AGL, 2000 ft. alt, Mach 0.70, 350k lbs.



Daily Peak Gusts In Lubbock Texas: Jan 1, 1991 - Aug 31, 1995

DSET	WBNID	STATION	ELEM	YEARMO	DAY01	DAY02	DAY03	DAY04	DAY05	DAY06	DAY07	DAY08
3210	23042	LUBBOCK	PKGS	199101	77020	22030	11021	66015	33019	22017	66021	66020
3210	23042	LUBBOCK	PKGS	199102	55020	55021	66026	22027	11019	33015	88014	55020
3210	23042	LUBBOCK	PKGS	199103	77040	77039	88028	88025	77052	77026	33020	66015
3210	23042	LUBBOCK	PKGS	199104	55033	77050	33022	33020	44019	55022	77028	77031
3210	23042	LUBBOCK	PKGS	199105	33027	33032	66031	77040	11027	55034	55036	44025
3210	23042	LUBBOCK	PKGS	199106	88029	66038	55024	55029	66048	77046	44017	11030
3210	23042	LUBBOCK	PKGS	199107	55021	88024	11019	44015	44016	55019	55019	55018
3210	23042	LUBBOCK	PKGS	199108	55020	55021	44022	44024	55022	55024	55019	22027
3210	23042	LUBBOCK	PKGS	199109	22016	77016	11035	22024	33016	33016	66020	55020
3210	23042	LUBBOCK	PKGS	199110	66014	66019	55027	11030	44014	55022	55024	66021
3210	23042	LUBBOCK	PKGS	199111	11028	22019	11016	55016	11029	22025	22025	55019
3210	23042	LUBBOCK	PKGS	199112	11020	77037	88017	66024	66020	66023	66030	66016
3210	23042	LUBBOCK	PKGS	199201	88020	77014	88010	66015	11018	44021	77031	11024
3210	23042	LUBBOCK	PKGS	199202	44012	55017	11025	11031	88017	11024	11014	55017
3210	23042	LUBBOCK	PKGS	199203	55027	55020	77036	66031	77037	77036	44032	77045
3210	23042	LUBBOCK	PKGS	199204	22034	44014	77020	55023	33025	66019	77027	55026
3210	23042	LUBBOCK	PKGS	199205	55030	11040	33018	44021	33021	33024	55025	55026
3210	23042	LUBBOCK	PKGS	199206	11047	11032	22012	44022	88037	88025	33019	88050
3210	23042	LUBBOCK	PKGS	199207	66024	55028	33027	55025	55025	55025	66025	44024
3210	23042	LUBBOCK	PKGS	199208	55018	55015	55018	55020	11018	55026	55021	55019
3210	23042	LUBBOCK	PKGS	199209	33022	88018	33016	55023	66018	44022	55021	55024
3210	23042	LUBBOCK	PKGS	199210	55016	44014	44014	55019	55022	44020	88045	66022
3210	23042	LUBBOCK	PKGS	199211	88034	66034	11031	11023	55026	11015	66022	55024
3210	23042	LUBBOCK	PKGS	199212	22034	44021	11026	11028	22020	77025	44014	77023
3210	23042	LUBBOCK	PKGS	199301	-99999	55018	66030	11025	55014	33016	11026	11018
3210	23042	LUBBOCK	PKGS	199302	55017	66021	11027	22024	11026	77011	66018	55020
3210	23042	LUBBOCK	PKGS	199303	66032	88026	11031	11031	77015	88022	77022	77024
3210	23042	LUBBOCK	PKGS	199304	11024	44035	88039	11036	55025	66038	77033	88029
3210	23042	LUBBOCK	PKGS	199305	88039	11031	44022	66034	44038	55032	55036	88050
3210	23042	LUBBOCK	PKGS	199306	55032	88032	77026	11032	44025	55040	66030	66030
3210	23042	LUBBOCK	PKGS	199307	55024	55028	55032	55033	55034	55033	55029	55030
3210	23042	LUBBOCK	PKGS	199308	11034	88017	22032	33020	11033	22014	44018	44021
3210	23042	LUBBOCK	PKGS	199309	55020	22038	22018	55019	55021	22020	88046	11020

Table 1: Peak Gusts: Lubbock Texas

DSET	WBNID	STATION	ELEM	YEARMO	DAY01	DAY02	DAY03	DAY04	DAY05	DAY06	DAY07	DAY08
3210	23042	LUBBOCK	PKGS	199310	66024	22020	22014	44017	55024	44026	55024	77028
3210	23042	LUBBOCK	PKGS	199311	55027	22029	66028	11040	22030	66019	66024	88016
3210	23042	LUBBOCK	PKGS	199312	55020	44014	11032	77024	22021	55020	88017	66017
3210	23042	LUBBOCK	PKGS	199401	66020	11051	66028	66024	66036	22036	22021	88024
3210	23042	LUBBOCK	PKGS	199402	11028	66027	66024	66026	88022	77032	55027	77043
3210	23042	LUBBOCK	PKGS	199403	11028	11025	66024	88020	44021	55020	22028	22038
3210	23042	LUBBOCK	PKGS	199404	55029	11044	11026	66027	11040	44023	55033	66029
3210	23042	LUBBOCK	PKGS	199405	44025	22023	44021	55021	66027	66025	11023	66033
3210	23042	LUBBOCK	PKGS	199406	44019	33025	33018	55020	44026	44024	66024	77028
3210	23042	LUBBOCK	PKGS	199407	11042	55028	55036	55026	55028	44024	55033	22028
3210	23042	LUBBOCK	PKGS	199408	55018	55020	88019	33024	33019	66021	33022	33022
3210	23042	LUBBOCK	PKGS	199409	33017	55020	55027	55022	22020	44017	44019	22033
3210	23042	LUBBOCK	PKGS	199410	55019	77024	66017	44023	55033	55031	11026	22030
3210	23042	LUBBOCK	PKGS	199411	66032	66040	66030	66035	88017	44021	55023	88030
3210	23042	LUBBOCK	PKGS	199412	55020	66020	77022	77027	44016	66037	44017	11024
3210	23042	LUBBOCK	PKGS	199501	22017	55015	11024	33009	-99999	88025	77025	77028
3210	23042	LUBBOCK	PKGS	199502	88011	77025	11037	77029	22020	88012	22033	55025
3210	23042	LUBBOCK	PKGS	199503	22016	22014	66020	77033	55024	66042	22023	55025
3210	23042	LUBBOCK	PKGS	199504	77017	55031	11047	11041	55013	44022	77030	66033
3210	23042	LUBBOCK	PKGS	199505	11027	55031	77028	22024	33035	44027	77037	77040
3210	23042	LUBBOCK	PKGS	199506	44017	44047	44035	22037	33030	77029	55025	55028
3210	23042	LUBBOCK	PKGS	199507	55021	77042	77032	66050	33021	44026	55021	44018
3210	23042	LUBBOCK	PKGS	199508	11031	11027	22021	33018	11023	55021	55023	55024

Table 1: Peak Gusts: Lubbock Texas

DAY09	DAY10	DAY11	DAY12	DAY13	DAY14	DAY15	DAY16	DAY17	DAY18	DAY19	DAY20	DAY21
22024	77015	11023	66018	77018	11026	88017	11021	22013	33015	77025	11036	11018
11023	22011	55016	77028	11029	33024	33025	77034	77041	22030	22027	66020	66014
33024	55036	66041	77044	22016	44032	66021	77043	77025	66024	55032	77026	66049
11040	55038	55035	66033	77028	77037	55027	66027	77030	11022	22025	44024	77027
44029	44032	55028	44024	11048	44030	66032	66032	33022	33025	44028	44022	44029
44021	22028	66046	66025	66025	77034	33023	11023	55023	22032	33030	88038	55023
44028	44027	66030	55019	55030	44021	55022	55023	55020	66020	55025	55022	55028
33020	44022	33020	33020	22020	22017	66015	55016	22031	11012	44020	55018	88020
55018	44022	55022	55022	55013	66019	44017	22024	44035	22036	22022	55012	55021
66016	77012	77014	44014	66021	22026	44016	55020	55024	55023	22020	22018	66023
66020	22025	55010	66012	55023	66023	22024	33025	66030	66032	11033	88021	77024
11016	55023	66021	77024	77029	55014	66016	66019	22023	33020	33017	22023	22022
77023	66012	55022	11031	88027	77016	11038	77022	22029	22016	66015	77014	66019
55022	77022	77022	77019	55018	77041	77026	66035	88040	88021	55022	66025	77032
11035	11024	66021	77026	77025	66024	33021	55029	66034	77039	11020	55023	22028
11035	44020	11026	22027	55027	55034	44030	22029	55025	11040	11036	88033	11020
44031	66040	77031	22019	55031	55024	44025	44018	22027	22022	44020	55038	44020
11027	11015	33046	88017	55022	55020	66022	55027	55023	44021	44044	33032	88032
11029	55033	66027	66030	55027	44018	55029	22027	88026	44026	55017	44018	55022
55022	11031	11029	22018	55016	22024	44017	44022	44023	55024	44012	55015	44017
55022	22024	55016	55025	55023	44020	44026	55020	55021	11028	88037	77026	11024
77026	11022	66021	55018	55029	55028	66027	22029	55014	44020	55023	44016	55020
55026	55020	88029	11028	55024	44010	55016	55021	66022	55017	11019	33023	11037
77030	88017	55024	55026	11031	11031	77021	88020	55021	55021	66018	11012	77021
11031	11021	77020	77030	44025	55014	88018	77023	33014	33015	77022	77025	77022
55020	77031	88037	77018	11017	44028	88023	22017	33017	66015	77027	66044	88033
77034	22025	22035	22033	66025	55027	88031	22029	22028	33020	22020	44022	55024
77035	77034	33020	77031	22033	22040	88022	55030	55036	66032	77039	11027	22018
11042	11033	11039	11029	22023	88028	44016	77044	77042	11030	22029	22021	55036
44023	11048	44024	55023	55024	44024	55025	66040	44027	44032	44037	88033	11031
55032	55022	77025	44018	55026	33022	44017	55025	55021	44029	55025	44024	55020
66022	55017	55021	55019	44021	55023	55022	55021	55020	55023	55020	44017	55025
66019	44017	55026	66036	11031	11027	55017	55021	44028	55029	55020	55018	55027

Table 1: Peak Gusts: Lubbock Texas

DAY09	DAY10	DAY11	DAY12	DAY13	DAY14	DAY15	DAY16	DAY17	DAY18	DAY19	DAY20	DAY21
11028	55019	33014	77026	22019	55021	77030	77030	66035	55013	33025	11036	44012
33014	66018	55027	77031	33026	77030	22022	77023	11014	66021	11036	55021	55021
77032	22019	55023	77051	88056	88020	44026	77024	11014	55018	11030	11026	11029
55026	11020	55016	88018	11022	77022	33018	11037	55024	33021	66022	22023	11011
77038	55015	55032	11036	66018	66028	22021	66018	55024	55029	77028	88020	33017
22027	55021	55029	11023	22017	66025	22028	66028	77031	88024	77031	77036	55020
66042	88052	88031	88023	66028	77036	22034	77014	66021	55022	44022	55016	33028
33026	33030	33030	77032	55024	11026	33017	44023	44024	33021	44020	55023	44021
22033	11042	55042	66027	55031	55033	44032	44031	55032	44023	33026	44017	33018
77033	44017	55022	44034	44033	88017	55022	55023	44024	66028	55026	55026	88040
33019	44018	44016	55020	44019	11024	22016	55016	55017	88032	55025	88032	44014
44019	44020	44021	44020	55023	88029	66021	22023	11012	77018	55016	55022	11038
55012	55015	44015	55017	44020	44028	66033	55024	77024	77024	66020	55017	77016
11025	44016	55022	44026	77025	11022	22017	55025	77042	44024	77034	77055	44016
11025	11026	55031	11019	55017	77017	44013	88015	22016	55021	66021	11020	77016
77024	77028	77028	88024	88015	55014	55020	77043	44025	88017	88013	33012	33020
77029	88026	22032	55022	33019	66044	11026	22016	66015	66026	11027	22023	55023
66030	55029	55032	66034	11041	11049	11019	33012	44016	55024	77037	44021	66027
66035	11033	77033	44016	55027	66033	66025	77024	77043	77030	66041	77031	22043
77022	22028	44025	66030	66025	11022	77029	55024	77034	11023	55027	55030	33022
11021	22040	22022	44023	55027	55031	55035	44034	44039	44028	44027	44025	33036
77017	33019	55018	55021	44025	44024	22026	44022	33028	66028	55022	22031	77029
44025	55022	66024	44022	55026	88032	66023	55022	55026	55022	33020	55031	33020

Table 1: Peak Gusts: Lubbock Texas

DAY22	DAY23	DAY24	DAY25	DAY26	DAY27	DAY28	DAY29	DAY30	DAY31
77029	33016	66024	11024	66023	77023	66029	11029	11014	55019
44020	66024	22023	22034	22016	66025	66032	-99999	-99999	-99999
77049	77026	55023	66030	77047	77032	77034	44030	33033	77015
22026	44026	66033	66034	77036	44029	77047	66027	77036	-99999
44027	77043	33021	44020	55031	55035	44029	55030	66032	44031
44020	33028	44024	55025	55027	55025	44026	55025	55027	-99999
55022	44024	22020	22016	55018	33036	44018	44014	55015	44016
33018	33014	44019	44022	44017	55020	55025	88020	11023	11029
22017	55017	11032	77013	33017	55020	55016	55020	55016	-99999
66028	66025	77017	55014	44022	33031	66033	11021	22025	88022
11031	11028	66024	44016	77020	55023	55025	66041	22029	-99999
66035	11031	55010	22012	88010	11013	66015	77018	44016	77021
88033	77022	55028	22030	33013	22013	44011	77011	88016	66015
11023	11028	11039	11022	77022	11024	88015	55018	-99999	-99999
11026	44025	88036	11028	55023	55038	66033	11035	44015	44017
55032	66026	22038	33022	66023	55024	11036	44017	55029	-99999
66038	11032	44035	44036	22024	88060	22033	44016	55020	44022
11036	55013	66020	22023	88030	44040	11030	44015	33023	-99999
55021	44024	55023	55023	88022	11014	33014	55015	55021	33020
55023	55023	55026	11015	33017	11022	55018	55023	55018	11025
11024	33013	44018	55025	22026	55012	33018	55017	55015	-99999
66019	66017	55014	66019	11025	55017	77029	44014	77023	77033
88026	77027	88041	11032	11025	88022	55021	11023	77021	-99999
77023	22016	55022	22029	55020	77027	55019	55017	66028	22022
55025	11041	55020	44013	44009	44019	11028	11028	55012	77019
88023	11022	66028	88031	33014	33017	44014	-99999	-99999	-99999
22031	55027	55024	44020	44052	44036	66033	77067	88035	88027
55030	66040	77032	22027	44026	44025	88029	22023	55026	-99999
55028	44027	44026	44021	44020	44023	44020	11031	22020	44023
44025	55027	55029	33022	33030	66024	55027	55028	44038	-99999
55022	55024	66028	66027	55027	55022	11031	33018	66017	55018
55026	55020	33036	77028	44030	44019	44017	55033	11028	22024
55027	55024	66023	11022	22037	66023	66016	55022	66028	-99999

Table 1: Peak Gusts: Lubbock Texas

DAY22	DAY23	DAY24	DAY25	DAY26	DAY27	DAY28	DAY29	DAY30	DAY31
55019	55018	55016	11021	11030	11023	77035	11043	11028	55019
66026	11025	11024	11023	77018	88023	77014	44015	55025	-99999
11032	11039	77028	66024	66022	88023	11016	22022	66020	66030
55018	55018	66024	44022	66039	88023	11018	66015	22034	22021
11022	77019	66034	11035	44015	55021	11036	-99999	-99999	-99999
55034	77029	22030	55018	66057	22035	77034	11029	22023	55022
88034	77026	55025	77046	77034	22041	88026	22040	88020	-99999
44028	55022	22034	55038	22034	33015	66020	11022	44018	44023
55020	11028	55021	55026	55025	33024	11044	88040	33026	-99999
66016	55025	44023	55016	11023	33013	66016	22040	55020	55018
44019	55022	44016	55021	55022	55020	55018	44020	11036	22022
11042	88024	11021	11018	77033	11017	55014	55023	66025	-99999
77013	55021	22027	22027	55018	55019	44020	11025	55021	11034
11025	11018	66023	22012	66032	88042	77035	11016	66023	-99999
44011	55008	55010	55016	55018	44010	22013	55010	44014	88022
11017	66015	55016	44012	66027	77036	11030	11025	77016	77028
55024	22031	33028	55022	77031	33022	22030	-99999	-99999	-99999
77039	33026	66035	66035	77028	22023	33026	33020	44019	11015
22035	11027	55023	55030	11032	22022	55027	11028	66027	-99999
66037	55040	22023	22026	77049	77036	22026	33039	33021	55024
55037	66036	11027	11020	11044	55029	77020	22027	22020	-99999
66024	44026	22029	55024	66030	66028	55023	22023	44023	22035
33017	44014	66021	66020	55021	55018	55015	55019	55024	55026

Table 1: Peak Gusts: Lubbock Texas

Daily Peak Gusts In Midland Texas: Jan 1, 1991 - Dec 31, 1995

DSET	COOPID	WBNID	STATION	ELEM	YEARMO	DAY01	DAY02	DAY03	DAY04	DAY05	DAY06	DAY07
3210	415890	23023	MIDLAND	PKGS	199101	66012	33028	22024	55015	66015	33019	33013
3210	415890	23023	MIDLAND	PKGS	199102	55019	55023	66020	11019	11020	22016	33015
3210	415890	23023	MIDLAND	PKGS	199103	77051	88045	88021	77030	77044	77042	33025
3210	415890	23023	MIDLAND	PKGS	199104	55029	77040	11016	22020	33025	55020	77027
3210	415890	23023	MIDLAND	PKGS	199105	44030	66038	77031	77037	22026	55029	55036
3210	415890	23023	MIDLAND	PKGS	199106	55028	22028	11028	66031	77042	44032	44020
3210	415890	23023	MIDLAND	PKGS	199107	55030	55023	22035	33019	44018	44017	55022
3210	415890	23023	MIDLAND	PKGS	199108	55015	55017	44022	44024	55026	55021	55020
3210	415890	23023	MIDLAND	PKGS	199109	22022	44014	33019	11031	44016	33019	33020
3210	415890	23023	MIDLAND	PKGS	199110	55013	66019	66021	11023	22025	44019	55021
3210	415890	23023	MIDLAND	PKGS	199111	11025	22026	22018	55017	22024	66021	22025
3210	415890	23023	MIDLAND	PKGS	199112	22019	77037	88013	55025	55018	66020	66024
3210	415890	23023	MIDLAND	PKGS	199201	11015	77024	77013	66013	88020	55024	77031
3210	415890	23023	MIDLAND	PKGS	199202	55017	44015	11028	22031	88019	11027	33014
3210	415890	23023	MIDLAND	PKGS	199203	55026	55017	77040	77040	77032	77022	55037
3210	415890	23023	MIDLAND	PKGS	199204	22037	22018	88021	44019	22026	66018	77023
3210	415890	23023	MIDLAND	PKGS	199205	55021	11027	33020	33018	33017	33023	55023
3210	415890	23023	MIDLAND	PKGS	199206	11033	88018	22016	44022	66019	33027	88034
3210	415890	23023	MIDLAND	PKGS	199207	55028	66029	44027	55027	55022	55025	44023
3210	415890	23023	MIDLAND	PKGS	199208	22027	66019	44016	55019	44022	55026	66022
3210	415890	23023	MIDLAND	PKGS	199209	22027	88024	33026	55025	55022	55032	66023
3210	415890	23023	MIDLAND	PKGS	199210	33025	44018	33017	33016	55024	44027	11045
3210	415890	23023	MIDLAND	PKGS	199211	11032	77027	11040	11023	66023	55014	66018
3210	415890	23023	MIDLAND	PKGS	199212	88030	44023	55020	22029	22024	77028	22016
3210	415890	23023	MIDLAND	PKGS	199301	22011	55016	55017	11022	55017	55016	77030
3210	415890	23023	MIDLAND	PKGS	199302	55013	55012	11019	11018	88022	66010	66016
3210	415890	23023	MIDLAND	PKGS	199303	66037	66023	11023	22024	88015	11029	66015
3210	415890	23023	MIDLAND	PKGS	199304	11021	55040	77049	88030	55021	66036	88033
3210	415890	23023	MIDLAND	PKGS	199305	88060	88030	66021	55028	44034	66024	44042
3210	415890	23023	MIDLAND	PKGS	199306	55031	66032	66032	11027	44029	44033	55038
3210	415890	23023	MIDLAND	PKGS	199307	55027	66029	55032	55034	55026	55028	55029
3210	415890	23023	MIDLAND	PKGS	199308	22028	55025	33025	44020	55024	22022	66032

67

Table 1: Peak Gust: Midland Texas

DSET	COOPID	WBNID	STATION	ELEM	YEARMO	DAY01	DAY02	DAY03	DAY04	DAY05	DAY06	DAY07
3210	415890	23023	MIDLAND	PKGS	199309	55016	55015	11044	44014	44021	33020	11015
3210	415890	23023	MIDLAND	PKGS	199310	55018	22023	22023	55015	44028	44028	55028
3210	415890	23023	MIDLAND	PKGS	199311	55034	11021	55020	66031	11034	11016	55023
3210	415890	23023	MIDLAND	PKGS	199312	55023	33014	11028	66022	22018	44020	55015
3210	415890	23023	MIDLAND	PKGS	199401	77019	88046	66024	11022	66028	77040	66016
3210	415890	23023	MIDLAND	PKGS	199402	77026	55021	66021	66020	11020	66018	55020
3210	415890	23023	MIDLAND	PKGS	199403	11035	88020	55020	77023	77022	77027	33028
3210	415890	23023	MIDLAND	PKGS	199404	55024	11044	44018	66032	11039	11021	44031
3210	415890	23023	MIDLAND	PKGS	199405	44023	33021	22020	22019	55027	55020	11020
3210	415890	23023	MIDLAND	PKGS	199406	22024	22023	22018	55020	33024	33028	77027
3210	415890	23023	MIDLAND	PKGS	199407	44025	44024	44026	44024	77053	55028	22030
3210	415890	23023	MIDLAND	PKGS	199408	55020	33020	44019	88032	22022	55021	44024
3210	415890	23023	MIDLAND	PKGS	199409	22021	44020	44024	55021	11028	22023	44019
3210	415890	23023	MIDLAND	PKGS	199410	55018	55020	33020	44023	55034	66034	11024
3210	415890	23023	MIDLAND	PKGS	199411	66024	55029	55022	88043	66030	44022	44024
3210	415890	23023	MIDLAND	PKGS	199412	-99999	-99999	-99999	-99999	-99999	-99999	-99999
3210	415890	23023	MIDLAND	PKGS	199501	22019	44014	22017	33019	55032	77037	66024
3210	415890	23023	MIDLAND	PKGS	199502	77016	66026	11034	66029	22028	22012	22038
3210	415890	23023	MIDLAND	PKGS	199503	22017	22018	55015	66035	66021	66046	11032
3210	415890	23023	MIDLAND	PKGS	199504	55017	44032	11035	11026	77016	66023	66025
3210	415890	23023	MIDLAND	PKGS	199505	11031	55028	77030	22025	11029	44026	66042
3210	415890	23023	MIDLAND	PKGS	199506	33018	44033	44027	44023	55025	66027	44021
3210	415890	23023	MIDLAND	PKGS	199507	44017	11038	66030	55025	55021	44026	55022
3210	415890	23023	MIDLAND	PKGS	199508	11030	77018	11019	33029	44018	55022	44022
3210	415890	23023	MIDLAND	PKGS	199509	33021	44019	44021	55021	55020	33020	22026
3210	415890	23023	MIDLAND	PKGS	199510	22019	88034	88012	66034	11025	22016	55024
3210	415890	23023	MIDLAND	PKGS	199511	66028	22023	22022	44020	55016	77037	66025
3210	415890	23023	MIDLAND	PKGS	199512	66019	77024	22021	66027	11029	22026	88027

Table 1: Peak Gust: Midland Texas

DAY08	DAY09	DAY10	DAY11	DAY12	DAY13	DAY14	DAY15	DAY16	DAY17	DAY18	DAY19	DAY20
55014	33026	11017	11021	66016	66022	88035	77026	22020	33017	22023	77029	11029
55022	88021	22018	66020	66029	88040	11025	33031	55026	77040	77031	11031	55012
77022	33026	55032	77025	77037	22016	55037	55020	88039	88026	55025	55037	77017
77037	11031	55036	55029	55031	77028	77035	55028	55023	77028	77029	22024	33031
33023	55036	44030	55030	66033	44032	77022	66031	66024	88024	33024	33037	55021
22029	44025	33027	33019	66031	77037	77052	55022	11027	44023	44028	44031	33027
55024	55025	44026	55025	44038	11021	55025	44027	55024	55018	55024	55022	44021
44015	22026	11028	11020	44021	33015	22016	55011	55014	22035	33015	33015	66014
55020	55022	55023	55027	55024	44014	55016	55021	22024	55031	22035	22025	33013
55018	55014	66013	66013	33024	77018	33030	55015	55017	66020	22019	22024	44023
55014	55018	33022	22013	22012	55021	55026	44020	77030	77033	66034	11034	88022
55021	11017	55025	55027	77025	77025	22023	66018	55014	55014	33017	22026	22028
11020	66013	44012	55021	88048	11039	77020	22039	66020	22014	11022	77011	55010
44015	66020	66027	77023	77017	55017	77030	88020	77041	77037	11018	55022	55023
88033	77044	11023	55023	88017	66019	66022	55020	66031	77032	77041	11027	55023
55023	55033	66020	11023	22025	55026	66028	55050	55031	55018	77031	11035	88033
55021	55029	77027	66022	77022	55025	33029	44023	44012	33018	33020	44020	55026
66041	55029	33028	22042	22034	55022	66019	66024	55026	55019	55025	55027	33035
55023	55027	55025	55026	55028	66029	66020	55022	33027	55020	11033	44020	33023
44022	55020	55020	33023	22022	22017	44023	11024	44017	55026	55016	33017	33031
44029	55020	33040	44017	55028	55024	44024	55026	55022	44020	22024	55018	77026
66018	66022	22028	66017	44017	66024	77031	77028	22025	55015	33020	55028	55020
66023	55025	55020	66032	11032	55018	55012	55015	55022	55021	55015	11018	66021
88033	77032	88022	55025	55024	11024	11025	77030	77029	66024	55020	22022	22021
11021	11024	22019	66013	88020	33022	55015	88029	66018	77026	22017	33021	77027
55022	55030	77037	77024	66014	22023	22020	66043	33020	22020	55014	66022	66048
55017	77024	11034	22025	11028	55021	44025	77029	22028	22025	55025	11023	33022
88029	66027	66034	-99999	66024	77031	11033	22018	44031	88028	66032	88028	11027
77036	88033	77023	88035	11027	22020	66019	66022	55036	55040	22025	55020	33017
66029	22033	11021	55025	55026	55023	44019	44027	55032	33024	44026	33023	22021
44027	44025	55024	88028	55030	55025	11034	55035	55032	44027	44025	33027	55033
44020	55019	55020	44024	33020	44024	55026	44022	55030	44023	55024	44022	55020

Table 1: Peak Gust: Midland Texas

DAY08	DAY09	DAY10	DAY11	DAY12	DAY13	DAY14	DAY15	DAY16	DAY17	DAY18	DAY19	DAY20
11022	33012	33019	55024	44019	55019	11030	44016	55017	44024	44024	55015	33019
77023	11026	55016	11018	77019	11020	44021	77017	55023	66025	88018	11037	11030
55014	22019	55026	55027	77030	77049	66032	11026	77022	22014	55017	11033	44014
55016	77018	77020	44021	77040	88040	77016	44029	88016	11016	33016	66016	11025
66019	55028	55020	44012	88018	11020	66015	22022	11034	55016	22020	55023	22023
88026	22024	55014	55025	11030	22012	55023	11019	55023	44023	44028	11025	11015
22030	11021	55019	44030	22021	11026	55015	22019	66015	66024	22028	66029	66038
44026	66031	22029	11033	66021	66023	66031	11039	33024	44021	44016	44022	44020
88030	44022	22035	88033	88024	66028	11019	22020	33019	33024	33024	33025	33023
55028	11039	33031	55040	55029	55033	44032	44029	55029	55029	33027	33039	33019
22026	44038	55018	55026	11033	11050	88031	33028	55022	44022	55026	44022	44023
55026	22034	33023	44021	55020	44027	22026	22022	44017	55017	55024	55025	22028
11026	22017	44018	44024	33019	44022	55024	33020	22025	44022	66015	55016	55019
22030	22018	22012	44014	44017	33023	44025	44026	55017	66019	88024	44017	55015
55021	11023	22020	44020	44028	44024	11021	11021	44021	66045	44017	66050	66038
22023	11025	-99999	-99999	-99999	-99999	-99999	-99999	-99999	-99999	-99999	-99999	-99999
77019	66023	77023	66030	88024	77021	55017	55019	66037	44023	77017	77018	44020
55026	66029	77030	11024	33021	33017	66027	77025	22022	11010	66020	11026	22012
55020	55026	44023	55024	66037	11034	11041	11022	22014	44019	55020	77028	11019
66031	66038	55039	66029	33020	44034	66034	55017	66029	77045	77032	77047	66033
66038	77028	22028	44027	66036	66030	22024	44028	55026	77044	11024	55022	44026
44026	44023	11040	11026	44019	55024	55027	44031	44033	44031	44026	44027	44023
55018	33015	33019	55021	44021	44021	55023	22033	44030	33022	33024	55025	77023
44027	44025	44027	44023	44024	55026	55025	66025	44023	44025	44023	33024	22024
11026	88039	22017	55019	44021	22026	33024	44026	66016	66018	44017	44031	55017
55019	77029	77024	44016	44021	11034	11011	44016	55019	55020	55019	11030	11015
55023	55024	77039	11022	66020	88020	44018	22022	55021	11017	55015	55019	33014
88036	22028	44024	55023	66024	66033	88020	88026	22019	11024	11030	-99999	44019

70

Table 1: Peak Gust: Midland Texas

DAY21	DAY22	DAY23	DAY24	DAY25	DAY26	DAY27	DAY28	DAY29	DAY30	DAY31
22020	66023	11015	77015	11023	55027	88025	66030	11026	22018	66016
55014	11019	55023	22026	22033	44018	66023	66028	-99999	-99999	-99999
77031	77047	77017	55022	66026	77038	88039	77057	88037	11031	66015
77039	88025	77022	77036	55030	77037	77028	77040	77036	22033	-99999
44030	55021	44055	44029	66024	55030	55027	44033	55035	66029	44032
55062	55022	44028	44024	55024	55030	55029	44029	44030	55033	-99999
77036	33024	33024	55026	22018	22016	55027	55013	33015	33013	22014
55015	22017	33013	44023	44017	33016	55018	55016	44012	22023	22021
55018	11022	11016	11028	77011	22020	44018	55022	44022	55014	-99999
55017	77018	66026	66023	55013	55019	77043	77027	22024	22021	11024
77027	11024	11027	66024	66020	66023	55021	55029	77044	22028	-99999
22029	66033	11027	33012	33016	22015	11017	55015	66014	55018	66024
66033	11034	77017	66026	33018	11013	22016	22014	22014	88017	33012
88037	11021	33029	11042	11028	11023	11021	77028	55020	-99999	-99999
77030	22024	55025	88033	22020	55025	55044	77032	11026	44020	88042
66018	55027	66016	33025	33023	55018	55020	88024	33017	55024	-99999
55022	88036	88032	33028	22034	33017	66022	11030	22017	44022	55020
22024	44020	55013	77016	22024	11041	55024	44024	33014	33022	-99999
55020	55020	44023	55024	55021	88030	22015	77024	55018	44018	33030
55019	55029	55027	55030	33019	22015	33028	55021	55029	33020	22030
22024	11028	33017	44017	55021	22030	33016	33028	44017	22016	-99999
55026	44024	55019	55018	88014	11022	55014	88033	77018	66024	11030
88036	66021	66023	88034	11024	88033	88021	66019	88019	77014	-99999
66014	55014	22020	22021	22032	55015	66016	44021	55020	55018	22026
77020	55022	11044	11020	44014	66010	55018	22019	11030	22010	66018
77032	66017	22019	22019	66021	22020	22019	33018	-99999	-99999	-99999
44041	11030	55024	66019	22026	33033	55027	66034	77040	77032	88022
33021	55026	77030	77038	11026	33023	44026	55038	33028	55021	-99999
11041	77036	77029	22024	44021	33019	33019	44027	33020	11040	33021
33019	77031	44023	55024	44021	44027	44024	44025	55032	55027	-99999
55022	55024	55022	55022	33028	55022	55021	44021	33019	55020	55016
44026	55022	33025	22048	22035	44022	33021	33022	66033	88025	11024

Table 1: Peak Gust: Midland Texas

DAY21	DAY22	DAY23	DAY24	DAY25	DAY26	DAY27	DAY28	DAY29	DAY30	DAY31
44024	55030	55024	55040	11020	11032	66022	55018	44022	55024	-99999
22014	33017	44015	44014	66012	22029	11021	66029	11035	11028	66019
55019	55022	55020	22024	22022	66013	77019	66020	88011	44023	-99999
55022	11031	55022	11028	55018	55022	77021	11015	33018	55014	55022
11016	66017	44016	55015	44022	66028	22020	22025	66012	11031	11023
22020	66037	11020	55028	22033	22015	44020	88044	-99999	-99999	-99999
11019	55028	66026	77034	44024	77039	11028	66027	22020	22027	55022
33018	44019	66026	44026	66043	55027	88030	11028	11029	11020	-99999
33023	44029	55026	55038	55045	88054	22014	44017	22024	22018	33024
22020	44015	11026	55014	55027	55028	55028	77029	11062	44022	-99999
33020	44019	44028	55026	55026	22023	22026	55021	44027	11039	44022
22017	44020	33028	44024	44024	33020	44025	55021	44024	33022	11030
55020	11036	88024	22020	22013	66017	22022	88013	44021	44022	-99999
77023	66016	55018	22023	11026	33020	55017	55020	44022	55022	11029
66011	11026	11018	66015	66018	55019	88027	66014	88024	55016	-99999
-99999	-99999	-99999	-99999	-99999	-99999	-99999	-99999	-99999	-99999	-99999
55019	11024	44016	44022	44021	77032	77036	11024	11024	77022	66024
44020	55020	22026	33024	55025	77028	22020	22025	-99999	-99999	-99999
-99999	66027	11019	55033	66033	77022	33026	33029	22020	33023	22017
22031	22036	11026	55024	55038	22033	11025	55024	88028	77037	-99999
55019	55028	77030	22028	66034	77047	66025	33027	22029	11024	88023
11033	88043	66030	11027	66033	33025	11022	44026	22029	88029	-99999
66030	33019	66023	22024	55022	44025	55026	44024	22028	22024	11023
33022	33025	44017	11018	33022	44030	44017	33021	44017	33021	44030
11035	11023	66019	11034	11026	44016	55017	11025	55021	88024	-99999
66023	66036	11024	44025	66017	66026	22023	33025	44027	44025	66033
55017	66022	22020	55018	66021	66034	22030	22026	77014	66024	-99999
33013	11019	44013	55014	11016	66016	33016	44022	44027	66033	77039

Table 1: Peak Gust: Midland Texas

Field numbers are shown with column positions in parenthesis.

FIELD 1: DATA ORIGIN

The original NCDC tapedeck of the dataset. Referred to in some of the tables below. *** Important Note: If tapedeck number is 3201 or 3202, this indicates the data are preliminary, with less quality control applied than the final data (indicated by 3200 or 3210). The 3201/02 data are replaced online by the final data as soon as final data are available. ***

FIELD 2: WBAN STATION NUMBER

This 5-character alphanumeric station identifier is assigned by the National Climatic Data Center. It originally referred to Weather Bureau, Army, and Navy (WBAN) stations which mailed weather observational forms to NCDC. These stations normally have more detailed data available than strictly cooperative stations, so stations with WBAN numbers will usually have additional data elements.

FIELD 3: STATION NAME

This 30-character alphanumberic field is displayed if the data selection is for data with Station Name. Spacing for all fields following are adjusted 31 characters (e.g., Division Number = 50-51).

FIELD 4 (22-25): METEOROLOGICAL ELEMENT-TYPE

PKGS

Peak Gust Direction and Speed.

Wind speeds are generally expressed in miles per hour through December, 1954, **and in knots from January, 1955 to the present.** A consistent exception is Navy stations, which used knots for the entire period of record. Example of value field XXYYY after 1954 for wind direction and speed: 44032; 44 = Wind direction from the SE. 032 = Wind speed 032 knots.

PKGS

WIND DIRECTION CODE
(16 Point WBAN Code)

12 = NNE	66 = SW
22 = NE	76 = WSW
32 = ENE	77 = W
33 = E	78 = WNW
34 = ESE	88 = NW
44 = SE	18 = NNW
54 = SSE	11 = N
55 = S	00 = Calm
56 = SSW	= Unknown

FIELD 5: YEAR-MONTH

This is the year and month of the data record. Range of values is 1850-current year and 01-12. Example: 199512 = December 1995.

FIELDS 6-36: VALUE OF METEOROLOGICAL ELEMENT

The actual data value is given as a five-digit integer. One major exception does exist however, for the DYSW (days with weather code) element-type values as explained in Table "D". A very small number of data values are known to have non-numeric entries. When a data value is missing, the sign of the data value is set to "-", the data value is set to "99999", flag position 1 is set to "M" and flag position 2 is blank.